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The E.H.P. Conference at Paris.

INTERNATIONAL E.H.P. Conferences have been held in Paris biennially since their inception in 1921. Last week's conference was, therefore, the fifth of the series. The organising authority is the Union des Syndicats de l'Electricité, acting in conjunction with the national branch of the International Electro-technical Commission. The membership is of a representative character, with the important reservation that German engineers are not invited. The question of their future inclusion was on the agenda this year, and a settlement in favour of the resolution would be beneficial to all concerned, for a conference of this kind falls short of its purpose unless it can draw upon the experience of all who can contribute something of value to the common stock. This consideration is quite apart from the wider significance of science, art, and sport as factors in the promotion of a better international understanding.

Although the E.H.P. Conferences were first intended (as their name implies) to deal with high-voltage transmission, their scope has been widened to include modern large-scale generation also. Nevertheless, transmission matters are still the predominant features of the programme and will, doubtless, continue to be so, since the tendency to concentrate generating plant in fewer and larger stations has increased the relative technical importance of transmission, owing to new problems arising out of the greater distances between sources of supply and loads. Transmission questions will just now be of more than usual interest to British engineers in view of recent devolopments here. It is true that the new schemes and most of the existing ones in this country are, strictly speaking, for interconnecting and not transmitting systems; that is to say, they consist in the linking up of power stations, at moderate distances apart, rather than the sending of large amounts of energy to far-off step-down sub-stations. Most of the papers, however, related to subjects pertinent to either system. Thus, to mention some of the topics covered, overhead-line problems are dealt with in papers on protection against lightning and surges, selective protection, supports, and the effect of atmosphere on insulator performance; underground cables by papers on the laying of single-core cables (66 kV and upwards) and

dielectric disturbances due to thermal expansion of conductors; and sub-station apparatus and general subjects by papers on the relation between transformer and line insulation, inter-turn insulation in transformers, insulating oil, arc rupture in switchgear, design of large switchgear, load control, and the construction of the British "grid."

As a result of the increase in the number and length of transmission lines, concurrently with the reduction in the number of small generating stations, capital expenditure on mains will form a greater proportion of the total than it has in the past. This variation gives prominence to two factors that have hitherto applied only in particular cases. The first is the decreased importance of obsolescence, as distinct from depreciation; *i.e.*, the economic life of material assets will more nearly coincide with the period allowed for loan repayments. The economic life of plant in small generating stations is often appreciably less than that allowed for the purpose of calculating sinking fund annuities. This may be due either to rapid growth of load requiring the supersession of a small set after a short life by a larger set, or to technical improvements justifying the installation of more efficient plant not necessarily of greater capacity. In transmission and distribution, on the other hand, obsolescence and depreciation may be regarded practically as identical terms. The efficiency of transmission is not susceptible of appreciable improvement, except by the employment of higher voltages, in which case the primary transmission lines become secondary transmission lines or high-voltage distributors.

A similar close relationship between economic and financial life holds good, though to a less extent, in the case of a high-efficiency base load generating station, constructed on a suitable site and containing plant approaching the limits of commercial efficiency. These considerations should give greater security to capital invested in the electricity supply industry.

The second factor referred to is that, as transmission and distribution costs are standing charges, a relative increase in capital expended on these portions of the system increases those charges which must be met irrespective of the amount of energy supplied. It will thus be essential for financial stability to secure a reasonable revenue at an earlier stage of development than might be requisite in the case of individual generation. It is possible that the low prices obtained for electricity in countries dependent upon water-power may be due almost as much to the commercial keenness engendered by a need for meeting heavy standing charges as to the absence of fuel costs. The effect of this should be both to stimulate efforts to acquire new consumers and to enable a low running charge to be made to all consumers with a view to encouraging the use of electricity to the utmost extent.

A Serious Omission.

MR. N. S. REYNTIENS'S report upon Belgium, which is reviewed in this issue, contains no reference whatever to the electrical manufacturing industry of the country, although recently-published official statistics showed that over 18 million kg. of electrical machinery and equipment was exported during the year covered by the report (*vide* ELECTRICAL REVIEW, March 29th, p. 581.) In this respect Mr. Reyntiens has inherited the shortcomings of his predecessor, Mr. J. Picton Bagge. It was Mr. Bagge's last report that led us to complain last year of the lack of information in this most important direction in the general run of D.O.T. reports. We may repeat what we said then:—"We feel that far too much attention is devoted to matters of purely national importance to the neglect of those phases of activity which have a direct bearing upon the interests of British manufacturers and traders. The latter want to know what their competitors are doing, and they are of the opinion that it is the job of our accredited official commercial representatives to give them this information."

May we hope that among the improvements which the new administration has promised to introduce, this by no means unimportant matter will receive attention?

Advertising a Public Service.

WE have received from the London office of the Metropolitan Life Insurance Co., of New York, a brochure entitled "Public Utilities Advertising." This presents a reasoned argument in favour of advertising by public service corporations—such as electricity, gas, telephone, &c.—and deals at some length with the nature and construction of utilities' advertisements. In showing the necessity for these concerns to advertise, the opinions of several leaders of the American electrical industry are quoted. Nine reasons are given why a public utility company should advertise; these are as follows:—(1) To sell securities; (2) To sell service; (3) To sell appliances; (4) To interest the stockholders and customers in the activities of the company; (5) To explain policies, business methods, *personnel* problems, and plans for development; (6) To defend itself when unjustly attacked; (7) To promote goodwill, thrift, safety and community development; (8) To explain to its customers why it has applied to the State Utility Commission for permission to raise its rates; and (9) To present arguments for the renewal of its franchise. While some of these objects apply purely to American conditions, there are many which are worthy of the attention of British supply authorities. Municipal electricity departments especially should explain to their "stockholders"—the ratepayers—what they are doing and can do. Too often developments which would arouse public interest and lead to an extension of the service are hidden in a report under the words "The minutes of the Electricity Committee were adopted." There cannot be too much general advertising of electricity, but individual advertising makes the greater appeal.

Engineering and Financial Statistics.

WE have received from the Electricity Commission, too late for more than preliminary comment in this issue, a new volume of the "Return of Engineering and Financial Statistics relating to Authorised Undertakings in Great Britain." This Return relates to the year ended December 31st, 1926, for companies, and (in most cases) March 31st, 1927, for municipalities. Thus the particulars given have reference to conditions obtaining more than two years ago and, in view of the rate of development in the electricity supply industry, they lose much of their practical utility on this account. The amount of work represented in compiling the tables and in preparing the lucid analysis in the first part of the volume must be considerable. Having regard to the other calls on the time of the Commissioners' staff during the past two years, the somewhat belated appearance of these statistics may be assumed to be inevitable. With the passing of the recent exceptional state of affairs, we may, no doubt, expect this flaw in an otherwise admirable compilation to be rectified in the near future.

During the period under review 6,618 million kilowatt-hours were generated (more than 98 per cent. by steam plant) and 5,606 million kilowatt-hours were sold. The aggregated maximum load reached 3,239,585 kW on undertakings and 2,700,594 on generating stations. The load factor for generation was therefore about 30 per cent. The sales of energy in bulk were more than twice those of the previous year. The number of undertakings holding supply powers increased from 593 in 1925-26 to 621 in 1926-27. Twenty-four generating stations were closed down. A.c. plant accounted for nearly 93 per cent. of the total of 4,682,069 kW actually installed, 91.5 per cent. of which consisted of turbo-alternators. Of the a.c. generating plant installed, more than 71 per cent. was three-phase 50-cycle plant.

The Pooley Hall Electricity Undertaking.

By means of pulverised-fuel firing and modern equipment and methods generally the full advantages of the small power station generating at the pit head are reaped.

THE colliery at Pooley Hall has an output of approximately 7,000 tons of coal per week, and, due to the soft nature of the coal, produces a large percentage of smalls, including smudge, to the extent of 16 per cent. of the total output, and ⅛-in. dust

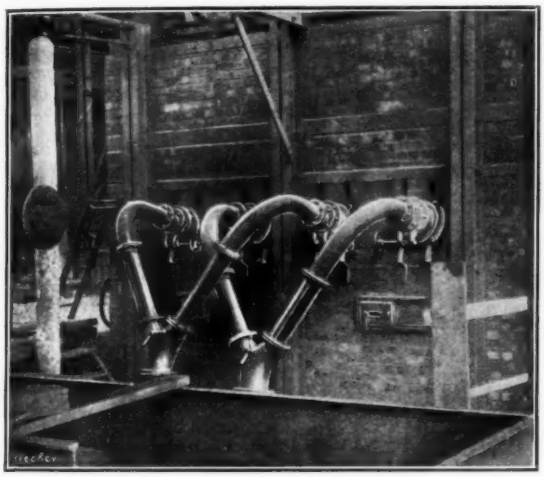


Fig. 1.—Arrangement of Burners on No. 1 Boiler.

to the extent of 12 per cent. The smudge and dust, respectively, have calorific values of about 10,700 B.th.u. and 9,500 B.th.u.

Initially the steam-raising plant at Pooley Hall consisted of four Lancashire boilers, 30 ft. × 8 ft., 100 lb./sq. in., fitted with ordinary fire bars. It is estimated that the cost of steam production at that time was 1s. 6d. per 1,000 lb. of steam, for fuel, wages and stores costs only. Attempts to raise sufficient steam by burning the smudge failed. Later two additional Lancashire boilers were installed, and the whole six were fitted with Bennis mechanical stokers. The result of that alteration was that it became possible to burn the smudge, and the steam production costs were reduced to 10d. per 1,000 lb. of steam. With low-grade fuel the output of the boilers never exceeded 4,000 lb. of steam per hour per boiler.

In order to try to increase the capacity of the boilers, and to burn the lowest-grade fuel (⅛-in. dust), it was decided to experiment with pulverised fuel on two of the boilers. A No. 10 "Atritor," supplied by Messrs. Alfred Herbert, Ltd., was installed for the necessary drying and pulverisation (see ELECTRICAL REVIEW, June 7th, 1929, p. 1002). This machine was capable of dealing with 2,000 lb. of fuel per hour, and was installed so as to serve the two boilers. It was directly coupled to a 40-h.p. motor, and the power demand was approximately 25 h.p. when the "Atritor" was working at its maximum output. In order to provide sufficient combustion space a brick chamber was built in front of each boiler, connected to the flues by tubular connections or necks. Combustion was completed in the chamber and the hot gases passed through the flues. The tubes connecting the boiler to the combustion chamber were of welded sheet-steel, ⅜ in. thick, and had hollow walls through which the feed water passed or circulated at atmospheric pressure, so keeping the temperature of the inside walls of the tubes below the fusing point of the ash and preventing slagging taking place. As a result of the pulverised-fuel firing 6,000 lb. of steam per hour per boiler was obtained. The thermal efficiency of the reconstructed boilers was, of course, not good, but the commercial efficiency was considerably increased.

As a result of the success of the firing with pulverised fuel, when it became necessary to again consider increasing the boiler plant, it was decided to install water-tube boilers and to fire them with powdered coal. Three Babcock & Wilcox boilers were installed, each with a heating surface of 5,346 sq. ft., and designed for an output of 18,000 lb. of steam per hour when fitted with chain-grate stokers. Two No. 10 "Atritors" were installed for each of the first two boilers, each machine being driven by a 25-h.p. motor. Improved design of the machines was responsible for the less power required. The energy consumed for each machine is not more than 18 kWh per ton of coal pulverised. For the third boiler a No. 16 "Atritor" was installed; this machine has double the capacity of each of the No. 10 machines. The pulverising machines are placed directly under the dust hoppers, the fuel falling into each machine through a small conical chute.

The first two boilers are equipped with four burners all near the top of the front wall of the chamber. The fuel-feeding arrangements are such that No. 1 "Atritor" in each case supplies burners one and three, and No. 2 machine supplies burners two and four. Fig. 1 depicts the feeding arrangement of the burners of one boiler. The alternate-burner scheme helps to keep the combustion chamber at a uniform temperature when only one pulverising machine is required. The

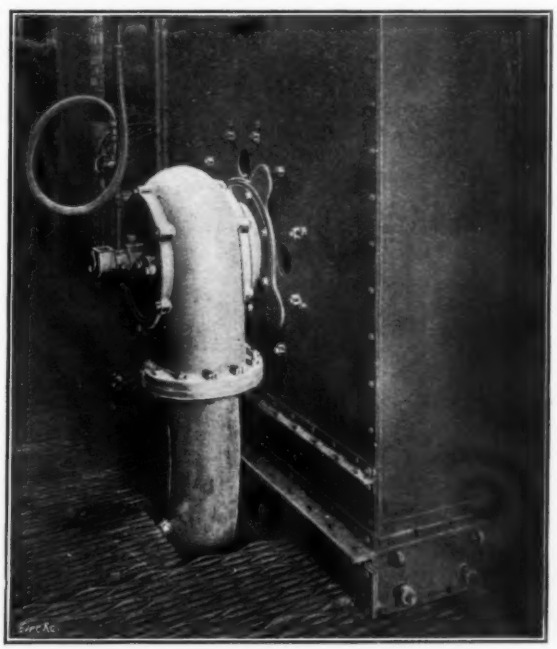


Fig. 2.—The Riley Flare Burner.

amount of fuel supplied to each burner can be regulated by means of a flap-valve placed on the fuel pipe near the burner. Auxiliary air is drawn in through port-

holes in the sides of the burners, and also through small doors built in the front of the chamber.

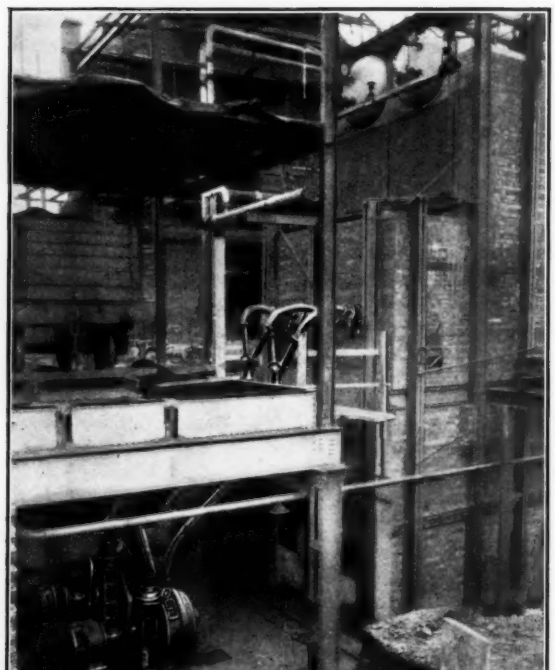


Fig. 3.—No. 1 Boiler During Construction, showing Pulverising Equipment.

On the No. 3 boiler only one burner of the Riley flare type (ELECTRICAL REVIEW, June 7th, 1929, p. 1002) is installed. This burner, fig. 2, is fed with auxiliary air by a small subsidiary fan, the amount of air varying according to the quantity of fuel consumed and to the amount of CO_2 it is desired to obtain. The combustion chambers of the water-tube boilers are of brickwork, with cavity walls on the three outer sides. The cavity walls serve to reduce radiation losses, and also to provide the hot air for drying the fuel during its pulverising stage in the "Atritor." The hot air is drawn from the chamber through a duct to the pulveriser by means of a fan which is an integral part of the machine. Fig. 3 is a view of the first Babcock & Wilcox boiler during erection, and depicts the general arrangement of the pulverising and firing equipment. Fig. 4 is a view in the boiler-house basement, showing the "Atritors" feeding the boilers. Fig. 6 shows more clearly the pair of pulverising machines which serve No. 1 boiler. The result of the working of the modern boilers on pulverised fuel, using the $\frac{1}{8}$-in. dust, has been to reduce the fuel cost to 6d. per 1,000 lb. of steam produced, or 8d. including interest and depreciation on the capital outlay. The coal consumed by the boilers is now about 350 tons per week, or 5 per cent. of the total output of the colliery, which is considered a very satisfactory figure. A test on one of the boilers showed an evaporation figure of 8.4 lb. of steam from water at 212 deg. F., per lb. of fuel, and an efficiency of 81 per cent.—this with fuel of a calorific value of 9,690 B.th.u.

In connection with the boiler equipment there is installed, *inter alia*, a pair of Weir direct-acting steam feed pumps, each capable of delivering 8,000 gallons of water per hour; a Kent Venturi recording water meter; and a Neckar water-softening plant. With the exception of No. 1 boiler, which has a Bailey recorder meter in place of a separate steam-flow meter and CO_2 meter, each boiler is equipped with a CO_2 meter and recorder, remote water-level indicator, Cope feed-water regulator, and so so. The operation of the Cope regulator as fitted to these boilers ensures a continuous feed being maintained during steady-load periods, and by temporarily restricting the flow on a sudden increase in load and increasing the flow on a sudden drop, enables rapid changes to be met without loss of steaming efficiency. The apparatus is thermostat controlled, an expansion tube being so positioned that its expansion or contraction varies with the water level.

As a result of the Pooley Hall concern becoming a public supply undertaking at a comparatively late date in its development, the generating plant is in two portions, a.c. and d.c., in two separate power houses. The d.c. plant consists of a 500-kW B.T.H. m.p. turbine, using steam at 160 lb./sq. in. direct from the boilers, and also the exhaust from the colliery winding engines; a Greenwood & Batley m.p. turbine (300 kW) fed in the same way; and two 150-kW Belliss & Morcom reciprocating sets. In the a.c. power house there are two 400-kW G.E.C. motor-generators, 6,600-V, 3-phase, 50 cycles, and a 625-kVA Belliss & Morcom set, 3-phase, 50 cycles, 440 V. The exhaust from this Belliss

Fig. 4.—"Atritors" in Boiler-house Basement.

engine is also fed to the m.p. turbines. Part of the 440-V a.c. supply is used at the colliery, and the rest is stepped up to the 6,600-volt transmission pressure for the public supply. Figs. 5 and 7 are views of the interiors of the d.c. and a.c. power houses, respectively.

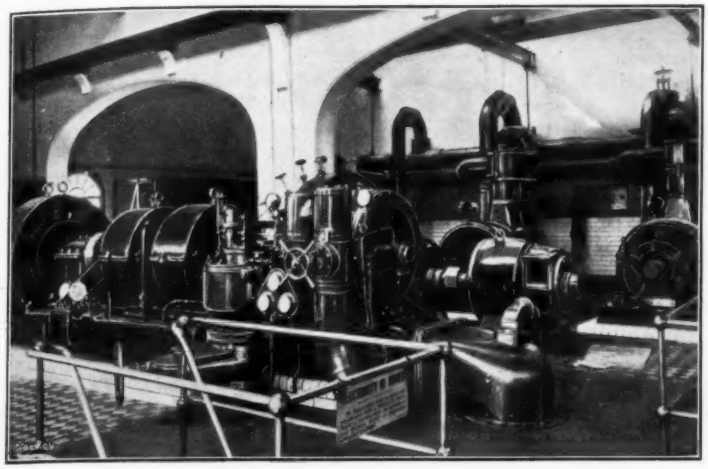


Fig. 5.—The D.C. Power Station.

Public electricity supply by the Pooley Hall undertaking started about 1924 when, "unauthorised," the company ran a pair of wires down the road to give a d.c. supply to a few of its employés and others. Additional consumers were continually asking for and being given supplies, until it became apparent that if the activities of the company in that connection were to continue the concern must be put on a proper working basis. The company accordingly applied for an Order to supply within an area of 100 sq. miles, comprising the whole of the rural district of Tamworth and parts of the districts of Atherstone, Market Bosworth and Ashby-de-la-Zouche. This order has been approved by the Electricity Commissioners and is now awaiting confirmation. Tamworth township has its own supply Order, but an agreement has been entered into between the Pooley Hall Colliery Co. and the Tamworth Corporation for a bulk supply to Tamworth for 15 years, and providing for the supply company to manage the whole of the distribution scheme for the Corporation for the first four years. At the end of 1925 the company was supplying over an area of 25 sq. miles, which has now increased to 35 sq. miles. The undertaking is proud of the fact that it was a pioneer of the free-wiring scheme, as a result of which it was able to obtain as consumers most of the available houses in Tamworth—that against competition with gas—and 85 per cent. of the available houses in the whole area. The tariffs adopted for the supply are 9d. per unit for lighting under the free-wiring scheme, 6d. per unit for ordinary lighting, and 1¼d. for heating and power. The company is developing the domestic supply, and has at present 600 cookers on its mains, half of which are in miners' cottages, where free coal is supplied. The cookers are hired out at 4s. per quarter, including an electric kettle. It is interesting to note that at the time of a visit to the colliery a selling campaign for electric irons was being run, the staff of the undertaking, including jointers, mates, and so on, all being salesmen under a competition scheme. Some five dozen irons were sold in the first two days, and a couple of gross in the week. Showrooms have been established in both Polesworth, where a public electricity supply was first given, and Tamworth.

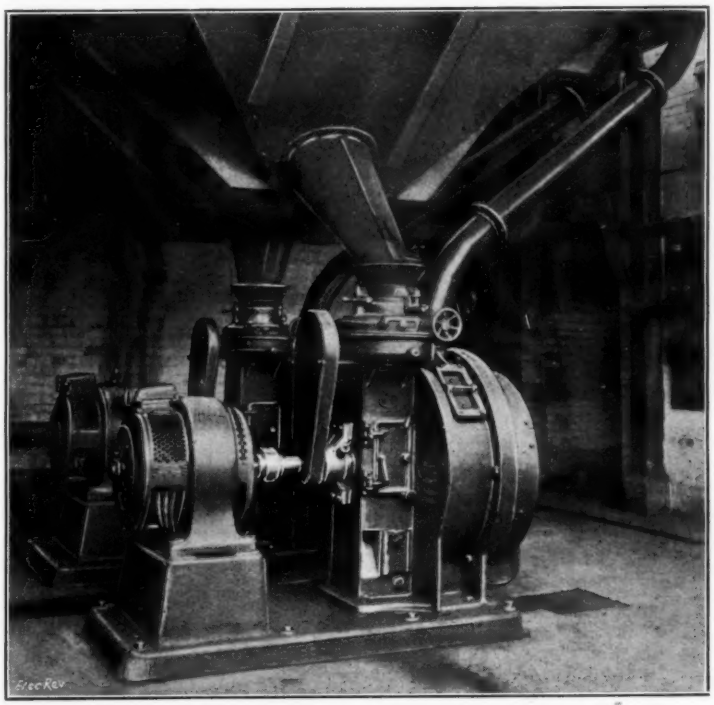


Fig. 6.—Pair of No. 10 "Atritors" serving No. 1 Boiler.

The total number of consumers on the mains is 4,960, including 1,486 in the borough of Tamworth. The load factor of the undertaking is about 40 per cent., including the colliery supply. The peak load of the undertaking last winter was 600 kW. There are 15 transformer sub-stations on the system, and the lengths of e.h.p. underground and overhead lines in service, respectively, are 22,000 yards and 4,700 yards. The original d.c. mains are gradually being changed over to a.c., and the d.c. overhead lines replaced by underground cables.

It is interesting to note that the undertaking is taking a very active part in schemes to endeavour to get new industries into the area, and is

Fig. 7.—The A.C. Power Station.

prepared to offer very attractive rates for electricity supply to such industries.

It is interesting to note that the Pooley Hall company is actively interested in a joint development committee that has been formed of a number of local influential persons to raise a fund for the purpose of bringing new industries into the area and generally advancing the prosperity of the locality.

The excellent results obtained in the working of the undertaking form a testimony to the foresight of the colliery officials. Their policy has provided an outlet for a considerable quantity of otherwise unusable fine dust coal at the colliery, thus reducing freightage charges to a minimum. Many arguments are put forward in favour of pit-head power stations, but it should be mentioned here that the Pooley Hall undertaking is particularly fortunate by way of its water supply. It is served by the Coventry Canal and also the River Anker, which flows through the Company's property.

In conclusion, we are indebted to Capt. Chaytor, director of the Pooley Hall Colliery Co., Ltd., who has been personally responsible for the development of the public electricity supply, to Mr. W. Fenn, manager and engineer of the colliery, and to Mr. J. Burns, of Messrs. Alfred Herbert, Ltd., for their assistance in the collection of the above information and for the photographs reproduced overleaf.

Ignition Power of Electric Sparks.

This contribution, being of the nature of an official communication from the Mines Department Testing Station, Sheffield, should be of value to designers of signalling and other electrical apparatus for use in explosive atmospheres.

By Capt. C. B. PLATT, M.B.E., and R. A. BAILEY, B.Sc., Ph.D.

THE flash, or spark, produced by breaking an electrical circuit in which is included an iron-cored inductance (*e.g.*, a signalling bell) is capable under certain conditions of igniting inflammable atmospheres of methane and air. If the iron core of the inductance is surrounded by a copper sleeve, or if, alternatively, a non-inductive shunt of suitable value is connected across the inductive coils, the induced voltage can be reduced and the incendivity of the spark eliminated. This principle is employed in the design of many signalling bells and other instruments for use in coal mines, wherein inflammable atmospheres containing methane are likely to be encountered.

During the course of experimental work on this subject it was also necessary to investigate the efficacy of such safety devices in the presence of inflammable atmospheres of hydrogen and air.

In general, atmospheres of hydrogen and air are considerably more sensitive, and require much less energy in the break-flash to cause ignition, than atmospheres of methane and air; apparently anomalous results were observed, however, when the spark-suppressing device consisted of a non-inductive shunt connected across the inductance; in consequence, experiments were made with a view to compare the efficiency of a non-inductive shunt in eliminating ignition of methane-air and hydrogen-air mixtures, respectively.

The circuit consisted of an air-cored inductance of 95 milli-henries connected in series with a non-inductive rheostat, a secondary battery of 26 volts, and a small gas chamber containing the contacts by means of which the circuit was made and broken and between which, therefore, the spark was produced. The contacts in the gas chamber consisted of a stationary platinum rod and a revolving strip of iridio-platinum (10 per cent. iridium) which made contact with the platinum rod once every five seconds: the shape of the revolving strip was such that the circuit was made slowly and broken rapidly.

Before making the experiments the apparatus was so adjusted that a current of from 240 to 250 milliamperes would ignite an 8.5 per cent. methane-air mixture; the air-cored inductance was then connected to the non-inductive shunt under investigation. The gas chamber was filled with the appropriate gas mixture and the current was regulated before the circuit was broken, so that the minimum value at which the gas ignited could be determined.

The minimum igniting currents for the most readily ignited mixtures of methane and air (methane 8.5 per cent.) and hydrogen and air (hydrogen 29.9 per cent.), respectively, are given in Table I. Determinations were also made, for purposes of comparison, with hydrogen-air mixtures containing 20.4 per cent., 10.4 per cent., and 7 per cent. hydrogen, respectively.

TABLE I.

MINIMUM IGNITING CURRENT, MILLIAMPERES.

Shunt ohms.	Methane 8·5%	Hydrogen 29·9%	Hydrogen 20·4%	Hydrogen 10·4%	Hydrogen 7%
None	240	82	82	94	182
10,000	265	142	140	150	230
5,000	297	174	174	180	250
2,500	350	240	240	240	300
1,000	430	380	390	370	420
500	610	550	540	530	600
250	730	670	670	670	750

An examination was then made of the minimum igniting current when a small iron-cored inductance fitted with a detachable copper sleeve was substituted for the air-cored inductance. The results are shown in Table II.

TABLE II.

MINIMUM IGNITING CURRENT, MILLIAMPERES.

Iron-cored inductance	Methane 8·5%	Hydrogen 28·5 %
Without copper sleeve ...	410 ...	250
With copper sleeve ...	1,160 ...	450

From the results given in Tables I and II it is evident that the non-inductive shunt is more efficient in preventing the ignition of hydrogen than it is in preventing the ignition of methane. For example, on the one hand, with an 8.5 per cent. methane mixture and a 29.9 per cent. hydrogen mixture the minimum igniting currents without a non-inductive shunt are in the proportion of approximately 3 to 1, while with a non-inductive shunt of 250 ohms they are, approximately, the same. On the other hand, the copper sleeve is considerably less efficient in preventing the ignition of hydrogen than it is in preventing the ignition of methane.

These facts are contributed in the hope that they may be of value to those concerned in the design of signalling and other electrical apparatus for use under conditions in which there may be a risk of a spark igniting inflammable gases.

The E.H.P. Conference at Paris.

A Review of the Proceedings.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

LAST week the fifth Conférence Internationale des Grands Réseaux Electriques à Haute Tension was held at Paris under the presidency of the French Minister of Public Works, supported by Mr. Ulrich, president of the Conference. There was a remarkably large British attendance, numbering nearly fifty, out of a total of 700 members from 28 countries (Germany is still excluded on account of the feelings of the French, though her admission to the next conference is one of the items on the agenda of the General Council). Undoubtedly the holding of the I.E.E. summer meeting concurrently with the latter part of the Conference contributed to the larger British attendance. Out of the 108 papers contributed, 15 came from Great Britain. It may not be generally known that the I.E.E. has a special committee for dealing with E.H.P. Conference matters.

Under the patronage of the Commission Electrotechnique Internationale, former meetings were held in 1921, 1923, 1925, and 1927, and exceptional and world-wide interest is taken in the proceedings. While this Conference may now claim to be well-established and universally supported, its range of subjects seems almost too wide. However, the width of its scope meets the requirements of most sections of electrical engineering, and undoubtedly encourages a large attendance. It is a convenience for each visitor, who may have travelled a considerable distance, to have several matters under review in which he is particularly interested.

Three new vice-presidents were elected this year, *viz.*, Messrs. C. E. Montanès (Spain), E. Wilczek (Hungary), and F. Brock (Austria). Mr. W. B. Woodhouse, who unfortunately could not attend this year, has been a vice-president from the commencement.

This year, only three British delegates were appointed by the I.E.E., instead of the eight to which the country was entitled. They were Messrs. P. V. Hunter, J. R. Beard, and Johnstone Wright. Unfortunately they were unable to attend during the opening two days and the concluding days, which points to the moral that the British delegates should be large enough in number to permit of official representation during the whole conference.

Year by year the organisation of this Conference continues to improve under the capable guidance of the director, Mr. J. Tribot-Laspière. He is to be congratulated upon the very excellent *vade mecum* that he provided, which, though only a detail, greatly added to the convenience of members. The official languages of the Conference were French and English, the former predominating. In this connection Mr. R. A. MacMahon rendered most valuable assistance by acting as the official interpreter. He has the happy knack of being able to give very concisely the gist of a speech in either language with a complete grasp of the finer technical points, which the average translator seems to miss in the effort to be precisely literal. Naturally it is Mr. MacMahon's type of version that is of most value to the listener.

Three of the British delegates and 18 other delegates were presented to President Doumergue, namely (from left to right in fig. 1): Messrs. C. Budeanu (Rumania), Norberg Schulz (Norway), V. del Buono (Italy), I. S. Gheorghin (Rumania), T. B. Thrige (Denmark), H. W. Young (U.S.A.), R. Borlase Matthews (Gt. Britain), J. Tribot-Laspière (secretary), K. Drewnowski (Poland), C. O. Mailloux (U.S.A.), Ronvaux, M. Ulrich (president), P. V. Hunter (Gt. Britain), J. R. Beard (Gt. Britain), E. Gevaert (Belgium), J. Tomanek (Czecho-Slovakia), S. Malmfors (Sweden), E. Wilczek (Hungary), S. Murata (Japan), Abd-el-Aziz Ahmed (Egypt), F. Brock (Austria) and K. Stromberg (Finland).

Fig. 1.—Conference Delegates who were Presented to the President of France.

Some of the leading Continental engineers will be recognised in fig. 2, amongst the British representatives being Mr. R. A. MacMahon, Mr. J. R. Beard, Mr. Johnstone Wright, Mr. G. H. Nash, Mr. P. V. Hunter, Mr. E. T. Painton, Mr. R. O. Kapp, and others in the centre; while in the doorway Mr. H. W. Clothier, Mr. R. B. Matthews, and Mr. J. Tribot-Laspière can be seen. The modern form of decoration and lighting in the meeting hall may be pointed out.

This year's session gave those who attended it a valuable opportunity of making themselves acquainted with the technical progress that has taken place during the last few years, and of getting into personal touch with engineers working in other countries who have solved problems, or who have them to solve, of a similar

character to those that many members have to face in their own countries. The proceedings of the Conference and the papers presented were of such a character as would unite in general common interest producers and distributors of electricity and everybody connected with the construction and operation of high-voltage networks, including also many matters relating to the economics of such affairs.

As at the last conference, the French Government gave its whole-hearted support to the deliberations by sending representatives from those Ministries which are materially interested in electric power, and the number of the reports sent in shows that many engineers in different countries are willing to reserve for the Conference the exposition of the results of their labours, and to give to their technical *confréres* the benefit of the fruits of their researches. A number of new constructions and methods were dealt with at the Conference.

The date chosen for the Conference, June 6th to 15th, is at the most pleasant time of the year for a stay in Paris, and arrangements were made after the Conference

Fig. 2.—A View of the E.H.P. Conference Hall at Paris.

for visits to be paid to installations of technical interest in the Pyrenees, the Alps, and on the Riviera.

In his opening speech Mr. Ulrich, the president, referred to the principal characteristics of the Conference. By the way, Mr. C. Le Maistre was one of the three delegates appointed by the C.E.I., the other two being Dr. C. O. Mailloux (U.S.A.) and Professor C. Feldman (Netherlands) who is also President of the C.E.I.

The programme of the Conference showed that, as usual, the papers to be discussed were divided into three sections, dealing with (i) power production and transformation; (ii) the construction and insulation of lines; and (iii) the operation of networks The Institution of Electrical Engineers' summer meeting commenced on the fifth day of this Conference, and facilities were afforded for English members to attend the Conference sessions on the last two days. During this week the members of the E.H.P. Conference had an opportunity of taking part in a similar extension to that of the I.E.E. party, by visiting the Pyrenees. This year of the 108 papers submitted, 15 came from this country, the authors and titles of British papers are as follows:—

Messrs. E. B. Wedmore, W. B. Whitney, and C. E. R. Bruce, "An Introduction to Researches on Circuit Breaking."

Mr. J. E. T. Cogle, "The Effect of Impurities on the Electrical Strength of Insulating Oil."

Mr. S. A. Stigant, "Transformer Inter-Turn Insulation."

Mr. H. S. Holbrook, "The Co-relation of Line and Transformer Insulation."

Messrs. B. D. Goodlet and J. B. Mitford, "The Influence of Atmospheric Conditions on the Performance of Insulators."

Messrs. H. W. Clothier and C. A. Stephens, "High-Tension Switchgear Developments."

Mr. J. R. Beard, "The British 132,000-Volt 'Grid.'"

Mr. R. Borlase Matthews, "Sawn-Timber Supports for Rural Overhead Lines."

Messrs. W. B. Woodhouse and E. B. Wedmore, "Overhead Electric Lines: An Account of the Work of the British Electrical and Allied Industries Research Association."

Messrs. P. D. Morgan and S. Whitehead, "A Study of Methods of Laying a Three-phase System of Single-Conductor Cables."

Mr. L. C. Grant, "Lightning and Surge Propagation in High-Tension Transmission Lines."

Mr. Reginald O. Kapp, "The Selective Protection of Transmission Lines."

Messrs. P. V. Hunter and J. Francis Watson, "Certain Aspects of the High-Tension Distributing Problem."

Mr. W. Fennell, "Supplying Large Areas from the 'Grid System.'"

Mr. G. R. Falkiner-Nuttal, "Load Dispatching on Large Electric Systems in the United States."

The proceedings of the Conference will be printed in the French language, though if there is sufficient demand an English edition will be obtainable. The proofs of the papers already exist in both languages.

The numerous papers were well classified into subdivisions under the usual three groups, the first of which dealt with the equipment and operation of generating stations and of transformer sub-stations, the second section covered the construction and insulation of transmission lines, and the third division was reserved for matters pertaining to the operation and arrangement of distribution networks. In a continuation of these notes a brief analysis of the various papers will be made, so that the main points may be brought out.

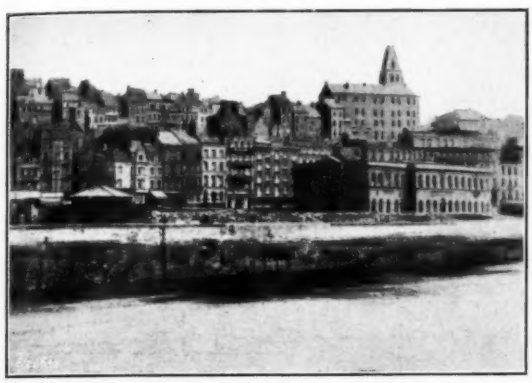
(To be continued.)

The I.E.E. in France.—I.

An Account of the Summer Meeting.

THE summer meeting of the Institution of Electrical Engineers opened in Paris on Wednesday, June 12th, in brilliant weather. As the E.H.P. Conference was still in session, the arrangement offered an opportunity to those attending the conference to take part in the I.E.E. programme also.

On the Wednesday morning alternative visits were arranged, one party going to the large stations at St. Ouen and Gennevilliers, and the other to the million-volt laboratory of the Compagnie Electro-Céramique at Ivry, where the generating station of Electricité de la Seine was also inspected.



Entering Boulogne Harbour.

The station at St. Ouen (or Nord station) is operated by the Compagnie Parisienne de Distribution d'Electricité and serves practically the whole of the centre portion of Paris. The load is mainly a lighting one and varies within the unusually wide limits of 19,000 kW in the morning and 300,000 kW at some periods in the evening. This station is interesting in that a number of the machines were made originally for 42 cycles and were subsequently altered for the present standard of 50 cycles. One very long engine room contains eight sets of 15,000-kW capacity running at 3,000 r.p.m., and eight sets of 35,000 kW running at 1,500 r.p.m. The generators are constructed for 12,300 volts, and are in the main supplied by the Ste. Generale de Constructions Electriques et Mécaniques of Belfort.

The main boilers supplying the larger turbines are of the " Stirling " type, constructed by the Cie de Fives-Lille.

The coal-handling plant is of considerable interest. Trucks of approximately 40 tons capacity arrive in a siding, the rails of which are slightly inclined so as to tilt the trucks sideways. The coal is washed out completely into a ditch by means of a powerful hosepipe, and is then lifted by large grabs to the top of a mound, where it slowly dries before being used. The whole unloading process is entirely dustless and would appear to be very economical.

From St. Ouen the party motored a few miles to the large Gennevilliers station (which was decribed in detail in our issues of July 21st, 1922, p. 89, and October 20th, 1922, p. 544 *et seq.*). Additions have been made since that date and the two latest machines are of 50,000-kW each. These sets, with the existing six 40,000-kW sets, give the station a total capacity of 340,000 kW. An entirely new boiler house has been found necessary to supply these later machines. The Union d'Electricité, which operates this station, supplies power to the whole of the suburbs of Paris, together with a certain amount to the Metro railways.

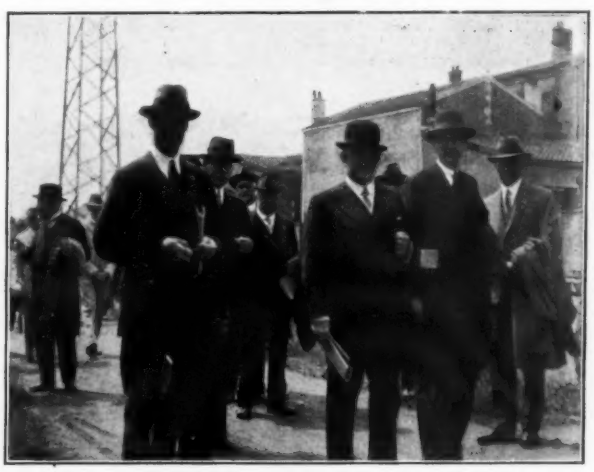
Nearly 200 miles of 60,000-V cable are in use and practically no trouble is now experienced, though a few years ago it was found necessary to replace some 3,000 joint boxes, an undertaking the magnitude of which will at once be apparent. Dr. Mercier, the engineer-in-chief, personally conducted the party round the station.

During the morning the ladies of the party were received by the French ladies committee and conducted to the famous establishments of Worth, where a mannequin parade was staged, and to Boucheron, where magnificent jewellery was displayed.

On Wednesday afternoon a number of members visited the Ecole Supérieure d'Electricité, where they were received and entertained to tea by Mr. Paul Janet, Director of the School. In the evening the members of the British Institution were entertained at a banquet given by la Société Française des Électriciens, la Compagnie Parisienne de Distribution d'Électricité, le Groupement des Secteurs de la Région Parisienne. A large number of French engineers were present and the evening proved most enjoyable.

Mr. Bunet (President of the French Society), who spoke in English, welcomed the party and congratulated the British Institution on its great membership. He was supported by Mr. Malégary, Technical Director of the Cie

Aboard s.s. " Riviera," Leaving Folkestone.

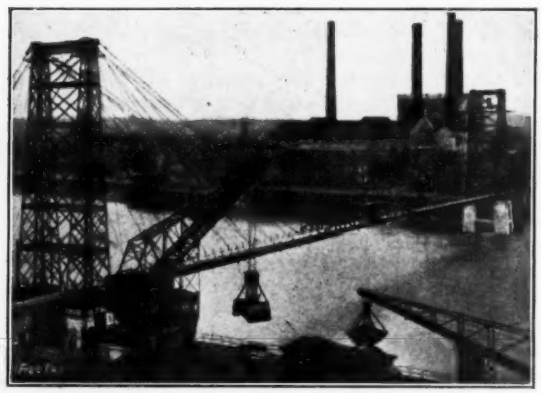


Leaving the Works of the Compagnie Electro-céramique at Ivry.

Parisienne de Distribution d'Electricite. Lt.-Col. Edgcumbe then replied in a witty speech, mainly in French, in the course of which he expressed the pleasure which it gave the Institution to be in France once more and the thanks which all the British members felt for the kindness and hospitality extended to them.

The Million-volt Testing Laboratory of the Compagnie Generale d'Electro-Ceramique.

Much interest was shown in the Ampere Laboratory of the Compagnie Generale d'Electro-Ceramique at Ivry-Port, which was established in 1923, and in which electrical tests at pressures up to 1,000,000 volts can be carried out. The Company, which is the largest manufacturer of porcelain insu-



Bridge for Cables between Vitry and Alfortville.

lators in France, and the first in that country to produce insulators for 220,000 V, has found the installation of great value in turning out material capable of standing up to very high pressures under all conditions. The laboratory is housed in a separate brick and iron building 118 ft. in length by 65½ ft. in width and 59 ft. high; the building is well "earthed," so that the laboratory practically forms a Faraday "cage." Internally it is divided into two sections, one being allocated to the transformers, while in the other are located the control gear, and on an upper floor is the actual test bed. Above the latter is a screened balcony from which the progress of the tests can be readily followed and the necessary records made.

The installation comprises a convertor set and three step-up transformers. Power is received from the local distribution service at 5,000 V, 50-periods, three-phase; part is reduced to 200 V for ordinary use. To provide against any irregularities in the amplitude of the local supply, a special convertor set is employed to give a constant frequency at all loads The 190-h.p. motor (200 V) is of the synchronised asynchronous type, while the 8-pole alternator to which it is coupled is so constructed that the output voltage never varies more than 2 per cent. of the sinusoidal-curve voltage. The ends of the stator windings are brought outside the machine, so that either single-phase can be used, or all three phases can be connected up in star or delta fashion. The 15-kW, 115-V exciter is common to both machines.

One million volts is obtained by means of three identical Haefely 500/375,000-V, 50-period, air-insulated transformers, each having a capacity of 125 kVA. The machines are furnished with compensating windings, the insulation between them being provided for by means of an air mattress contained in two Haefelyte concentric cylinders. The centre of the h.p. winding being connected to earth, the active parts of the apparatus are insulated from earth by large-diameter Haefelyte cylinders, the number of which is proportionate to the arithmetical average of the maximum input and output voltages. Thus, although the three transformers are alike, as mounted on their insulating cylinders they reach to different heights, *viz.*, 18 ft., 21¼ ft., and 27¾ ft. From the floor the height is actually 6½ ft. more in each case as, owing to the site of the laboratory being subject to flooding from the River Seine, it was found necessary to mount them on cement foundation blocks.

The transformers are so arranged that they can be used either singly, each to develop 125 kVA at 365,000 V between terminal and earth, or connected in parallel if that output is insufficient. One million volts between one terminal and earth is obtained by the cascade grouping of the transformers. In this case the first transformer is fed with power at 500 V; the second is excited by connecting together a similar number of turns of the secondary circuits of the first and second transformers, while the third is excited by directly connecting the primary circuit with the primary of the second transformer; that is to say, while there is a difference of only 500 V, the absolute voltage to earth is 625,000 V.

The transformers can be three-phase coupled by exciting the primary of each apparatus by one phase of the alternator, which enables three-phase current at 375,000 V between phases and earth to be delivered at the three ends of the secondaries, or practically 650,000 V between phases. In practice, the changes in the various connections are easily made by means of long sectionisers.

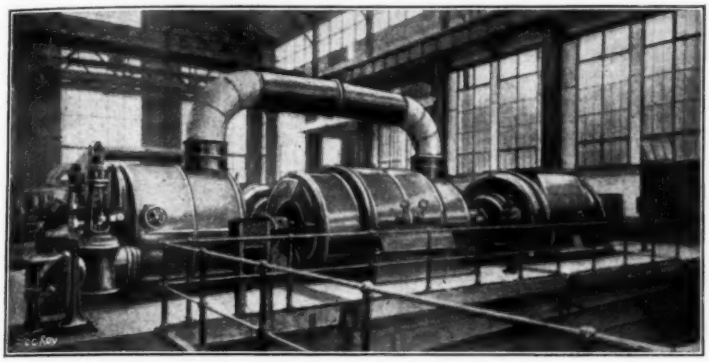
Within the laboratory the h.p. conductors consist of Haefelyte tubes lined internally with Dutch metal, the diameters for the respective voltages being 100, 200 and 300 mm. The conductors which are connected by brass spheres, 150, 300 and 500 mm. in diameter, are hung from the roof by tubular porcelain insulators, 19 ft. 7 in. in length.

The control apparatus and measuring instruments are grouped on a desk so located that the operator can see both the material under test and the transformers. Not being satisfied with the usual method of measuring the voltage by experimentally determining the ratio of the secondary to the primary voltages as shown by a volt-

Lt.-Col. Edgcumbe and Friends.

Mr. Bunet and Mr. Barnard.

meter, the Electro-Ceramique Co. measures the absolute voltage by determining the charging current of a condenser of known capacity connected up between the h.p. terminal and earth. The condenser employed consists of an upper sphere and, at the lower end of the gap, of a half-ball. The intensity of the current, rectified by an incandescent cathode lamp, is measured by a milliammeter graduated to give a simple reading of the voltage, unaffected by variations in either the atmospheric pressure, the temperature, the degree of humidity, or the ionisation of the air in the test room.



Turbo-alternator at Ivry Port Power Station.

While the installation is adapted for the testing of all kinds of h.p. apparatus, it is mainly employed for testing porcelain insulators under dry and rainy weather conditions and breakdown in oil. The dry tests are carried out within the laboratory, the chain of insulators under test being suspended from the roof trusses, and its lower end connected to a h.p. conductor. The tests under rain are conducted in the open air, where a short power transmission line has been erected; the line is of the normal 220,000-V type, but can withstand 650,000 V between phases, so that chains of insulators can be tested up to three times the present highest standard capacity. The oil breakdown tests up to 600,000 V are effected by plunging the insulators into a tank 16½ ft. in diameter and containing about 25 tons of oil. A low-pressure steam coil is provided in the tank, so that the oil may be heated up to a temperature of 90 deg. C.

Another interesting feature of the laboratory is a machine of the Company's own design and construction for the combined mechanical and electrical testing of insulators, it being so arranged that four chains at a time can be subjected to prolonged tests at a high voltage.

The Ivry Port Power Station.

The power station at Ivry Port, of the Société d'Electricité de la Seine, is the latest addition to the electricity-generating installations in the Paris district, and is mainly intended for the supply of power to the Paris underground electric railways, the requirements of which have outgrown the capacity of the original plant. The new station is located on the banks of the River Seine which, being subject to flooding, has necessitated the location of the main operating floors at a high level. Designed for an ultimate capacity of 130,000 kW, four turbo-generator sets, each of 15,000-kW capacity, have so far been installed, this size of set having been decided upon as being the most suitable for the particular purpose, the conditions being such that whilst all four sets are required for the busy morning and evening traffic periods, one is sufficient for the load during the other parts of the day.

Owing to the risks of floods the firing floor of the boiler house is approximately 35 ft. above ground level. The installation comprises eight Babcock and Wilcox boilers, six having automatic chain-grate stokers, while two are arranged for pulverised-fuel firing. The chain-grate boilers have a heating surface of 6,835 sq. ft., with 3,853 sq. ft. superheaters; they are capable of each supplying 41,900 lb. of steam per hour at a pressure of 313 lb. per sq. in.; the final temperature after superheating being 707 deg. F. The two pulverised-fuel boilers have each an output capacity of 61,730 lb. of steam per hour; the heating surface of the boiler proper is 6,942 sq. ft., and of the combustion chamber 1,345 sq. ft. Both types of boiler were supplied under a guaranteed efficiency of 85 per cent.

Coal for the boilers is received both by barge on the river and by rail, the wharf being of sufficient length to enable two 800-ton barges and two 200- to 250-ton trains or wagons to be simultaneously unloaded. Coal bunkers are available for the storage of between 11,000 and 12,000 tons. A feature of the station is a water de-aerating, distilling, and feed-heating apparatus which was constructed under the patents of the (English) Contraflo Engineering Co., Ltd. The turbines, which run at 3,000 r.p.m., are of the Escher Wyss compound type and are directly coupled to 21,400-kVA generators built by the Société des Ateliers de Constructions Electriques de Jeumont, 50-cycle current being generated at 10,500 V. Each alternator is provided with a 74-kW exciter and with closed-circuit air circulation. Two Breguet 650-kW auxiliary turbines running at 1,000 r.p.m. are also installed, these being coupled through gearing with a ratio of 1 : 6.9 to 250-V three-phase generators.

The h.p. switchgear is housed in a four-storey building and comprises the apparatus for controlling the four alternators and two groups of feeders, each of the latter consisting of six cables of 5,000 kW capacity at 10,500 V. The first floor houses the cable end boxes and apparatus for putting the cables under load; on the second floor are the bus-bars connected to the external feeders and the synchronising voltage transformers, while the alternator oil-circuit breakers and the transformers for auxiliary service supply are on the third floor. The upper storey is devoted to the main bus-bars, the potential transformers and the synchronising gear.

General View of Engine-room at Ivry Port Power Station.

A feature of the station is the provision, in case of any defect in the desk board control connections, of apparatus contained in a cupboard alongside each alternator for the emergency synchronising and regulation of each unit.

(To be continued.)

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this Section.

A New Spot- and Flood-light.

The accompanying illustration, fig. 1, depicts a standard model of the new "Stella-Ray" spot- and flood-light which is being marketed by the NEWMAN ELECTRICAL CO., 5 and 6, Eden Street, Hampstead Road, N.W.1. The essential characteristic of this unit lies in the unique effects achieved by the projection of an intense beam of light in a given direction by a scientifically-designed reflector, which can be of silvered glass, or, alternatively, of heavily-nickel-plated copper. The "Angle" type of fitting has three movements and an adjustable holder

Fig. 1.—The "Stella-Ray" Angle Flood-light.

support with locking nuts. The design of the "Stella-Ray" fittings is such as to enable the light rays to be projected in any direction desired. In the case of shop-window displays, the use of the "Stella-Ray" units affords, it is claimed, a unique method of "spotting" any particular article of merchandise. It is claimed that a light equivalent to 1,000 c.p. is concentrated in a given direction for a loading of 150 W. "Daylight Blue" lamps used in conjunction with the "Stella-Ray" units ensure an ideal medium for colour-matching purposes. Perhaps one of the most fruitful fields for the introduction of this new spot- and flood-light lies in the realm of colour effects. Beautiful multi-colour effects have been achieved by the use of ordinary 100-W colour-sprayed bulbs, without the interposition of artificial colour screens.

Small Repulsion-Induction Motors.

It is encouraging to note the increasing number of British firms which are now developing the smaller classes of electric motors, fig. 2. Among the latest contributors to this class of manufacture are Messrs. HIGGS MOTORS, Witton, Birmingham, who are producing a new range of small repulsion-induction motors with capacities varying from 0.1 to 1.5 h.p. They are claimed to be particularly suitable for driving line shafting,

Fig. 2.—"Higgs" Repulsion-Induction Motor.

air compressors, pumps, and so on. These machines are constructed with double-wound rotors. On the periphery of each there is a winding somewhat similar to that of a d.c. armature connected to a commutator in the usual manner; below this there is a squirrel-cage winding. The windings work in conjunction with one another and develop a high starting torque with a reasonably low starting current. The brushes are permanently on the commutator. The smaller motors are provided with chilled cast-phosphor-bronze bearings and lubricated by the wool-yarn system. They are well protected from falling dirt, as there are no openings in the shell or on the top of the end covers to admit foreign matter. The frames are arranged to run in the horizontal position; should they be required to operate on a wall or ceiling, the position must be specified when ordering, so that the end cover can be correctly fitted. The larger motors can be run on the floor, wall, or ceiling, without alteration, as they are fitted with ball bearings. The standard rotation is clockwise when viewed from the pulley end, but the rotation can be reversed by a movement of the brush rocker. It is claimed that the makers' test complies with B.S.S. Nos. 168 and 170—1926. At starting the machines develop approximately twice full-load torque with approximately three times full-load current. The machines can be thrown directly on to the line. When a starter is used, the motors develop 35-40 per cent. full-load torque with full-load current. The starters are designed to pass full-load current on the first stud, but the torque increases as the starter handle is moved over.

A New Pocket Lamp.

Messrs. BATTERIES, LTD., Hunt End Works, Redditch, have just marketed a small pocket lamp, fig. 3, fitted with a "Nife" accumulator. The particularly interesting feature of this apparatus is that owing to there being no gases given off during discharge the cell is fitted with solid plugs, thus making

Fig. 3.—The "Nife" Pocket Lamp.

the battery, it is claimed, absolutely leak tight. One charge of the battery will give, it is claimed, the same output as 10 dry batteries suitable for the lamp. The output should prove useful for meter reading and other purposes for which it is desirable to avoid constantly changing the batteries.

A Meter-testing Load Outfit.

To provide a means of reducing the consumption of electricity during meter testing, the A.E.G. ELECTRIC CO., LTD., 131, Victoria Street, Westminster, S.W.1, has introduced the "Phantom" load transformer. The principle employed is that of loading the current coils of the meters under test at reduced voltage, the pressure coils being fed directly from line. The apparatus consists of a transformer and a resistance, the latter being connected to the secondary winding of the transformer. The whole is housed in a small oak box similar to that of the calibrating meter. The primary of the transformer is connected to the voltage terminals of the meter to be calibrated, and the supply pressure is thereby transformed to a few volts. The secondary of the transformer is connected in series with the current coils of the meter to be calibrated and the test meter. The current can then be regulated by means of the resistance between 0.1 and 10 A. The load is adjusted through a regulating rod, which is provided with graduations, so that the adjustment may be read. In order to increase the range of regulation, the secondary winding consists of two coils which may be connected in series or in parallel by inserting one or two plugs. There is a further winding on the secondary side of the transformer, which supplies an incandescent lamp for indicating whether the transformer is under load; it also serves to light the scales and counters. The primary coils are protected by a fuse against overload resulting from connection to a wrong terminal. The current leads are secured by strong wing nuts to the terminals.

Legal.

A Trade Union Libel Action.

ON June 13th at the Liverpool Assizes an action for damages for libel was brought by the Electric Supply Workers' National Association and its secretary, Mr. G. Gorton, against Messrs. C. Dukes, M.P., J. T. Watkins, and J. H. Hampson, of the Union of General Workers.

It was stated by Mr. J. E. SINGLETON that the plaintiff union was recently formed in view of the necessity for a special body to look after the interests of workers in the electricity supply industry. It met with opposition from the established trade unions who considered that the new body intended to undermine their position. The association was "turned down" by the employes' side of the Whitley Council and a pamphlet was issued stating that the employers' side had decided not to recognise or negotiate with Mr. Gorton while his association remained unrepresented on the Council. It was also stated that anybody who joined the Association would be deprived of the benefits and protection which were afforded by representation on the Whitley Council. This statement, said Counsel, was untrue and there were no grounds for saying that the Association was disruptive. The Union of General Workers, in 1925, had offered Mr. Gorton a position if the Association amalgamated with the Union, but he declined it.

Evidence was given by Mr. Gorton, who was cross-examined by Mr. Cyril Atkinson, K.C., for the defendants, and the hearing was adjourned.

When the case was resumed on June 14th evidence was given by members of the Association, who said that they had read the circular in question. One witness stated that he was present at a meeting at which the defendant Hampson said that Mr. Gorton had offered to hand over the Association to the General Workers' Union provided that he and two others were given positions. Hampson had stated that the Union could not take the Association over owing to its financial position.

The treasurer of the Association stated that the circular had caused some decrease in membership.

For the defence, Mr. ATKINSON, K.C., said that the plaintiffs had violated one of the cardinal principles of trade unionism by endeavouring to induce men who were already members of a union to join the Association. Mr. Gorton's real grievance was his exclusion from the Whitley Council.

At the conclusion of the action on June 15th the jury was unable to agree. The parties consented to a majority verdict and the jury awarded the plaintiffs £250 damages. Judgment, with costs, was entered accordingly.

Ferranti, Ltd., v. Measurement, Ltd.

A SETTLEMET was mentioned in the King's Bench Division on June 13th in connection with litigation between Ferranti, Ltd., and Measurement, Ltd.

Mr. G. O. Slade appeared for Messrs. Ferranti, the plaintiffs, and Mr. W. T. Monckton for the defendants. The settlement was announced to Mr. Justice Avory.

Mr. SLADE said that the litigation, which was between two well-known companies of electrical meter manufacturers, would not be continued. The matter was an action for libel and the plaintiffs complained of advertisements inserted by the defendants in issues of electrical trade papers in June and July, 1927. For the plaintiffs he was instructed to say that they admitted that the words of which they complained were not defamatory and they desired to withdraw the action. It had been agreed between the parties that each should pay its own costs. That being so, his friend, Mr. Monckton, for the defendants, agreed that there was no need for any order of the Court to be drawn up.

Mr. MONCKTON consented to the withdrawal of the action on these terms.

Venture Trust, Ltd., v. The Marconi Company.

BEFORE Mr. Justice Clauson in the Chancery Division on June 14th, Mr. Jenkins, K.C., on behalf of the Venture Trust, Ltd., moved for an injunction against Marconi's Wireless Telegraph Co., Ltd., and Senatore Marconi and the other directors to restrain the defendants from carrying into effect the scheme for the merger of interests by the sale of the communications assets of the defendant company and certain other companies to Imperial and International Communications, Ltd., and the exchange of the stock and shares of the defendant company and such other companies for shares of Cables & Wireless, Ltd., or taking any other steps for the purpose of carrying the scheme into effect until judgment in this action or further order.

Mr. JENKINS stated that in 1922 the defendant company made an issue of 6½ per cent. debenture stock and on December 31st, 1927, there was outstanding of that debenture stock £1,207,186. The holders of that stock were given an option which they might exercise at any time within ten years to exchange their stock for £1 ordinary shares. If the option were exercised the stockholder would obtain a premium of 200 per cent. At the beginning of 1927 the company had suffered heavy losses and the capital was reduced to £4,000,000. Ten shillings was struck off the ordinary shares, and a certain number of ordinary shares remained unissued to satisfy the debenture stockholders in case they should exercise their option. Shortly after the reduction of capital the shares of the company began to rise in price very rapidly. Plaintiffs attributed that to the "Beam" system, but the defendants attributed it partly to the reduction of capital and to the fact that dividends were in sight. The directors urged the debenture stockholders to exercise their option to convert. Some months before this the plaintiffs had bought £10,000 of debenture stock at a large premium, the option appearing at that time a valuable one that might be exercised. The directors stated that each £3 nominal value debenture stock entitled the holder to convert such stock into one fully paid ordinary share of £1 with dividend rights equivalent to those of two 10s. ordinary shares. In the meantime the "beam" system had become valuable and had created difficulties for the cable companies. The plaintiffs had exercised their option and received 3,333 £1 shares, in addition to which they bought others at a premium of 68s. a share to bring their holding up to 4,000 shares. The debenture stock was virtually disposed of by conversion. When the offer for the exchange of shares was first mooted there was a rumour that the directors proposed to restore the 10s. which had been written off the old £1 shares. This was, however, not done, but the Marconi directors wanted to treat the 10s. shares on the same basis as the £1 shares. They had treated the £1 shares as if they were divided into two moieties, and said that with regard to one moiety of 10s. they would give £50 preference shares in a new company, thus getting rid of that moiety, and the plaintiffs would then have only one moiety of 10s.

An affidavit by Mr. F. G. Kellaway, managing director of the Marconi Company, was read by Mr. LIONEL COHEN, K.C., counsel for the company. He stated that it was not the fact that the rise in the quotation of the ordinary shares began to take place on the success of the "Beam" system, which had been demonstrated at least a year before. The primary cause of the rise was the writing off of accumulated losses by the reduction of capital, which paved the way for the resumption of dividends. Only £1,185,537 of the debenture stock of the Marconi Company was converted into shares. It was untrue to say that only 500,000 shares in the Marconi Company were issued otherwise than for their par value, and that those 500,000 shares were issued at a small premium. The holders of the 10s. shares had borne the whole of the loss under the reduction scheme for the benefit of the shareholders as a whole, and the directors thought it right that their loss should be considered. Any holder of £1 shares who considered himself aggrieved had only to refuse the offer, in which case he would remain as a shareholder in the Marconi Company with all the rights incidental to his holding of £1 shares.

His LORDSHIP said he did not understand what Mr. Jenkins was asking him to stop the Marconi Company from doing.

Mr. JENKINS said that, technically, the offer was by the Merger Company, but the directors of the Marconi Company were nearly one-half of the Merger Company, and they were putting forward the scheme to the detriment of the Marconi shareholders.

His LORDSHIP considered that counsel had not brought anything to his mind which entitled him to stop them.

Mr. JENKINS said that they were acting contrary to the rules which the Court had laid down to be followed by directors of companies, and they were doing an injustice to the plaintiffs.

The hearing was concluded on Monday last. Mr. Jenkins, resuming his argument for the plaintiffs, said that if the scheme as a whole was wrong the defendants ought to be restrained from taking any part in it.

The JUDGE pointed out that the Marconi Company was not making the offer of the exchange of shares. It was being made by Cables & Wireless, Ltd., which was not a party to these proceedings.

Mr. JENKINS contended it was really the Marconi Company which had brought about the offer of exchange of shares, and that this was a breach of duty.

The JUDGE said that if Cables & Wireless, Ltd., was doing something wrong it might be restrained, but Mr. Jenkins was not asking that.

Mr. JENKINS said that the Marconi Co. could be restrained from carrying out the scheme as a whole by selling assets as part of the scheme.

The JUDGE said that the company was not selling its assets as part of the plan if accurate language was used.

Mr. JENKINS said that the directors of the Marconi Company were unfairly using their powers to induce the Merger Company, the board of whch they formed nearly one-half, to make an offer for an exchange of shares on a footing that was unjust to plaintiffs.

Mr. GAVIN SIMONDS, K.C., also addressed his Lordship on behalf of defendants.

Without calling on Mr. COHEN, K.C., for the defendants, Mr. Justice CLAUSON, in dismissing the motion, said that he had nothing to do with the question of whether the offer made to the £1 shareholders was not a fair and proper one. The £1 shareholder could accept it if he liked, and if he did not accept it he would remain a shareholder in the Marconi Company. The Merger Company was not a party to these proceedings, although the directors of the Marconi Company were also directors of the Merger Company. The Merger

Company not being before him, it was impossible for him to interfere with it in offering its shares to the shareholders of the Marconi Company in exchange for their shares. The terms of the sale of the Marconi Company's assets to the Imperial Communication Company were not yet fixed, and he could not stop the directors of the Marconi Company from negotiating the terms of such a sale unless he was satisfied that they were about to commit a breach of duty towards their shareholders and were selling the assets at an insufficient price or in circumstances in which they were sacrificing the interest of their company, but at present nobody knew what the terms were going to be.

Mr. JENKINS asked for leave to appeal.

His LORDSHIP said that the plaintiffs had a right to appeal without asking for leave.

Thefts from Meters.

AT Morecambe Police Court, last week, two apprentice plumbers, Lawrence Taylor and Hubert Bowden, were found guilty of thefts from electricity and gas meters. There were reported to have been thefts amounting in total to about £50, and numbering nearly 60. The youths had obtained access to houses by their plumbing work, and used keys to open meter locks, sharing the proceeds equally. The relatives of the lads undertook to reimburse the money, and their employer said he was willing to take the youths back into his employ if his customers were prepared to trust them. The magistrates bound Bowden (the younger) over for two years on condition that the money was repaid. Taylor, who had been in trouble before, was sent to prison for three months with hard labour. Mr. ROBERT WALSH, Deputy Town Clerk, stated that for the past 18 months there had been a great amount of suspicion against officials of the Electricity and Gas Departments on account of these thefts.

Breach of Electricity Regulations.

AT Gateshead Police Court, on June 12th, Messrs. Clarke, Chapman & Co., Ltd., electrical engineers, were fined £50 for a breach of the Electricity Regulations under the Factories and Workshops Act. The prosecution was the sequel to a fatal accident in which an apprentice moulder named Wilfred Hughes was killed on March 22nd at the company's Gateshead works. Mr. R. H. ROGERS, H.M. Inspector, said that Hughes was carrying a ladle which came in contact with some live copper wires. A fellow worker ran to help him, but when he touched Hughes he received a shock. The current was cut off and the youth fell to the ground and died shortly afterwards. Mr. Rogers said that there was negligence in that the wires were not properly safeguarded. Mr. J. L. TAYLOR, who defended, said that this was the first instance of lack of thorough inspection at these works over a period of 60 years. Steps had been taken to prevent the occurrence of any similar accident.

Marconi Royalties Appeals Succeed.

IN the Chancery Division on Tuesday last, Mr. Justice Luxmoore delivered his reserved judgment allowing the appeals by Marconi's Wireless Telegraph Co., Ltd., against the decisions of the Comptroller-General of Patents in favour of the applications of the Brownie Wireless Co. of Great Britain, Ltd., and the Loewe Radio Co., Ltd., for compulsory details, in the case of the Brownie Co. to manufacture receiving sets at a lower royalty than that demanded from other manufacturers, and in the case of the Loewe Co. to manufacture in this country triple and double valves in respect of which the royalties payable to the Marconi Co. should also be substantially lower.

Mr. Justice Luxmoore allowed both appeals and directed that the orders of the Comptroller-General should be discharged. He held that it was not in the public interest as the Brownie Co. claimed that such a licence should be granted to it, that the terms of the licence offered by the Marconi Co. were not unreasonable, and there was no evidence to support the Brownie Co.'s contention that reduction of the royalty would have the result of bringing into existence a new class of purchasers who were now prevented from buying valve sets by the prevailing prices. In the case of the Loewe Co. the Judge held that there had been no refusal to grant a licence by the Marconi Co., as terms were never defined, and therefore the time had not arrived when the Loewe Co. was in a position to apply for a compulsory licence. He thought the establishment of a factory by the Loewe Co. in this country would be in the public interest, and he hoped that the parties would come to terms.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

Electrical Review Index.

The Index to Vol. CIV (for the half-year ending June 30th, 1929) will be published shortly, and we shall be glad to receive the names and addresses of those who require it (free of charge) for binding purposes, or wish to retain it for reference. Application should be made as early as possible to the Publisher, 4, Ludgate Hill, E.C.4.

The Co-ordination of London Passenger Transport.

At last week's meeting of the London County Council, Mr. Silkin, a Labour member, put forward a motion that the Parliamentary Committee should be instructed not to proceed further with the London County Council (Co-ordination of Passenger Traffic) Bill. He said that the sponsors of the Bill had been defeated in the General Election, which showed the trend of public opinion in the matter. Sir John Gatti refused to accept this construction, and stated that the result was a national and Imperial matter and did not upset the mandate which the Council had previously received. The onus of rejecting the Bill must be borne by the new Government; the Municipal Reform Party would not relieve the Government of that responsibility. After further debate the motion was rejected by 60 votes to 45.

Telephone Development Work.

In a recent issue we urged the General Post Office to make greater efforts to acquaint the public with the nature, scope, and convenience of its telephone service. We are consequently pleased to see an attractive folder that has been issued by the G.P.O. containing some particulars of telephone facilities and charges. On the outside of this publication there are two coloured maps. One depicts the British Isles divided into zones by concentric circles with their origin in London. In each belt there are smaller circles divided into three sectors which give the rates for a three-minute call between 7 a.m. and 2 p.m., 2 p.m. and 7 p.m., and 7 p.m. to 7 a.m. The other map shows the Continental telephone links. The principal cities are shown and the day and night rates are given in each case. The remainder of the folder is devoted mainly to an extension of this information in table form, one page giving the three rates for calls from London to about 130 provincial towns, and another giving the day and night rates for calls to the principal Continental cities. Elsewhere it is stated that Anglo-Continental telephony now reaches Ceuta (Morocco) on the south, Warsaw on the east and the Arctic Circle on the north.

Another Large American Merger.

The *Financial Times* reports that Messrs. J. P. Morgan and Co., of New York, are effecting a merger of electrical utility companies in Upper New York State representing a total capital of $500,000,000. The principal concern involved is the Buffalo, Niagara & Eastern Power Co., operating at Niagara Falls and the western part of New York State, with assets valued at $221,000,000. There are three other large companies and several smaller concerns.

Contractors Visit G.E.C. Works.

A visit was paid to the works of the General Electric Co., Ltd., at Coventry on June 12th, by about 150 members of the Western Section of the Electrical Contractors' Association. The visitors were received by Sir William Noble, a director and chairman of the Coventry Chamber of Commerce, and were entertained to luncheon in the pavilion on the works sports ground. They were subsequently conducted round the factory and shown the processes in the production of modern telephone and radio equipment.

The "Exide" Convention.

As we reported in our last issue, this year's convention of "Exide" service agents, arranged by the CHLORIDE ELECTRICAL STORAGE CO., LTD., was held at Brighton. In the accompanying picture the Mayor of Brighton (Ald. H. J. Galliers) is seen chatting with Mr. D. P. Dunne, sales manager and director of the Chloride Co. It was most appropriate that Brighton should have been chosen as the *venue* for the convention, for Ald. Galliers is a leading electrical contractor of the county borough, and the local "Exide" service agent.

Mayoral Welcome to "Exide" Agents.

Among the 400 or more delegates to the Convention were several from the Dominions. The idea behind these annual gatherings is the co-ordination of selling and service principles and the evolution of a policy for the ensuing year. This year's meetings were held in the Royal Pavilion, and the banquet, which is a feature of the event, took place in the Dome. Mr. D. P. Dunne presided, and proposed the health of the Mayor and Corporation of Brighton, thanking them for the excellent reception accorded to the delegates. Ald. Galliers responded to the toast.

Bankruptcy Proceedings.

S. E. HUNT, 8a, Torwood Street, Torquay, electrical engineer and contractor.—The first meeting of creditors was held on June 7th, at the Official Receiver's offices, Exeter. The statement of affairs showed liabilities of £2,312, against net assets of £499, leaving a deficiency of £1,813. Debtor attributed his failure to heavy overhead charges, interest and rent, bank charges, &c., preventing him earning sufficient to meet living and personal expenses; the inconvenient situation of his shop; a loss of £100 on a large contract; and legal costs. Mr. E. H. Hawkins, of Messrs. Poppleton, Appleby & Hawkins, 4, Charterhouse Square, London, E.C., was appointed trustee of the estate. The following are creditors:—

	£		£
Bates, A.	195	Fulford, T. R.	30
Bune, J.	52	Falk, Stadelmann & Co.	112
Brearley, H.	25	General Cable Manufacturing Co., Ltd. ...	50
Berry's Electric (1928), Ltd.	32	Johnson, Miss	105
Castellina Co., Ltd. ...	24	General Electric Co., Ltd.	23
Cleave, H. R., & Co. ...	62	Lighting Trades, Ltd. ...	23
Driver, F.	212	Newcombe, F. D., & Co.	40
Ever-Ready Co. (G.B.), Ltd.	30	Philips Lamps, Ltd. ...	39
Emanuel & Sons, Ltd. ...	65	Richardson, W. E. ...	50
Edison Swan Electric Co., Ltd.	36	Roe, E. A.	66
Foster Engineering Co., Ltd.	80	Santon, Ltd.	31
		Underwood, Mrs.	100
		Universal Lamps, Ltd. ...	33

J. A. HENDERSON, trading as "Hendersons," electrical contractors, 28a, Basinghall Street, E.C., and "St. Olaves," Hall Lane, Walton-on-the-Naze.—The first meeting of creditors was held on June 12th, at the London Bankruptcy Court, before Mr. E. Parke, Official Receiver. The debtor filed his petition on May 30th, and was adjudicated bankrupt the same day. He states that he has always been engaged in the electrical trade, and during the war was employed in cable making. After the Armistice he acted as managing director of Henderson & Thornton, Ltd., and subsequently, for a short time, of Osbornes, Ltd., which absorbed the former company. In June, 1925, he started on his own account as an electrical contractor, under the registered name of "Hendersons." Contract work was obtained in London and the provinces, and he did very well for a time, but business had fallen away during the past two years, with the result that the profits were not sufficient to cover the overhead expenses, and, being pressed by creditors, he filed his petition. The labour troubles of 1926 had an adverse effect on the business. The liabilities were estimated at about £2,500, against assets estimated to produce £315. The failure was attributed to the industrial unrest and to general slackness in the electrical trade. Mr. D. C. Evans, 18, Ironmonger Lane, E.C., was appointed trustee.

H. PEOVER, Market Lane, Newcastle-upon-Tyne, electrical apparatus and tool merchant.—The public examination was held on June 6th, at the Court House, Newcastle-upon-Tyne. The statement of affairs showed liabilities of £1,868 and assets of £236, leaving a deficiency of £1,632. Debtor stated that he commenced business on his own account in October, 1925, without capital. His father, to whom he owed £225, guaranteed a bank overdraft up to £500. In October, 1927, he began the manufacture of wireless sundries; this was successful until October, 1928, when creditors began to press. He attributed his failure to want of capital, losses on manufacture of wireless apparatus, owing to a smaller demand than was anticipated; loss by forced realisation of stock, and bad debts. The examination was adjourned.

G. A. NORMAN, electrical engineer, 44, Lancaster Street, Barnsley.—First and final dividend of 5s. 2d. in the £, payable at the Official Receiver's office, County Chambers, King Street, Wakefield.

H. SAVORY, electrical engineer, 7a, Hill Street, Shaw.—First and final dividend of 6s. 6¼d. in the £, payable at the Official Receiver's office, Byrom Street, Manchester.

J. DEAN, electrician, 4, Gogerddau Place, Aberystwyth.—Receiving order made June 6th, on a creditor's petition.

W. H. LAURENS, radio engineer, 492, Prescot Road, Old Swan, Liverpool.—Receiving order made June 12th, on debtor's own petition.

E. A. WARNES, electrical and radio engineer, 10, Crescent Gate, Wilmslow Road, Rusholme, Manchester.—Receiving order made June 10th, on debtor's own petition.

G. WILMINGTON, electrical and radio engineer, 75, Railway Street, Nelson.—Receiving order made June 6th on debtor's own petition. First meeting June 21st, at the Official Receiver's office, District Bank Chambers, Blackburn. Public examination July 23rd, at the County Court House, Burnley.

W. T. JACOB, wireless engineer, 14, Meyrick Street, Pembroke Dock.—Last day for proofs for dividend, June 28th. Trustee, Mr. H. W. Thomas, 4, Queen Street, Carmarthen.

Company Liquidations.

SOUND STORES, LTD., 29a, Charing Cross Road, W.C.—Under a compulsory winding-up order made against this company last January, accounts have been lodged showing total liabilities of £7,088, and a deficiency of £4,995 with regard to contributories. The Official Receiver, who is liquidator, reports that the company was incorporated as a private company in March, 1928, to carry on business as dealers in wireless sets, gramophones and records. The issued capital of £2 only is held by Nathan Gordon and his wife, who have been the only directors. Gordon was appointed chairman of the company at a salary of £80 a month, and Mrs. Gordon acted as saleswoman, receiving £2 10s. a week. Together, therefore, although the company had no capital, they were taking money out of the business at the rate of £1,090 per annum. The company appears to have obtained goods on credit without much difficulty from a wide circle of traders. The company started business at 9, Great Newport Street, W.C., with the aid of £500 shown by the books to have been advanced by Mrs. Gordon, who subsequently made further advances on the security of debentures, the validity of some of which will have to be carefully considered. As early as August, 1928, the company was unable to meet its liabilities, and creditors began to press for payment. On November 13th, 1928, Mrs. Gordon appointed Mr. F. E. Branstone, receiver and manager under powers on her debentures for £1,200; a resolution for voluntary liquidation was passed eight days later, and a petition for compulsory liquidation was presented on December 18th, 1928. The receiver has paid £1,077 to the debenture holder, and has paid over a balance of £155 to the Official Receiver. The Official Receiver observes that Gordon's explanations of many matters are far from satisfactory, and it is clear that the company's trading and accounts will require close investigation.

VERDON CUTTS & CO., LTD., 87, Fargate, Sheffield, electric furnace manufacturers.—A meeting of creditors was held on June 13th at the Institute of Chartered Accountants, E.C., when Mr. C. L. Widlake, Sheffield, the liquidator, presided. He reported that the liabilities amounted to £7,739, all due to unsecured creditors, and the net assets to £490, leaving a deficiency of £7,249. The company was incorporated in 1922, and took over a business which had been established in 1909 by Mr. Verdon Cutts, who had traded as Verdon Cutts and Co. Certain assets were purchased, including goodwill £500, and drawings and designs £6,000, and office furniture. The capital of the company was £10,000, and was later increased to £19,500. From the commencement of the trading of the company down to the date of the liquidation, continuous losses had been sustained, and the total loss to date was £19,427. When the company was established it was considered that there was a good market for electric furnaces, and it was hoped to get large orders from abroad. The orders were not sufficient, however, to place the company on a sound financial basis, and throughout the period of trading the overhead charges and the expenses had generally been too heavy for the turnover. The matter remains in the hands of the present liquidator.

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H. & S. SCOTT, LTD., wireless manufacturers, &c., Barbican, E.C.—The statutory meeting of creditors was held on June 12th at the Institute of Chartered Accountants, E.C. The liquidator reported that the liabilities were £2,362, and the net assets £2,333, leaving a deficiency of £29. The business had been in existence for a number of years, and the company was registered in 1919, the issued capital being £1,002, all of which was fully paid. For a number of years the company traded successfully, but losses had been sustained on the wireless department. That department was developed with a view to a separate company being floated, but trading losses had been incurred. The stock consisted very largely of wireless parts, but it was in good condition, and negotiations were proceeding for the sale of those assets as a whole. A resolution was passed confirming the voluntary liquidation of the company, and an advisory committee of three of the creditors was appointed.

BRIGHTLINGSEA ELECTRICITY SUPPLY CO., LTD.—Winding up voluntarily. Liquidator, Mr. A. C. Lucas, 167, Strand, W.C. A meeting of creditors is called for June 25th, at 167, Strand, W.C. Particulars of claims to the liquidator by July 25th. (The above meeting is purely formal, as all creditors have been or will be paid in full.)

SHEFFIELD WIRELESS DEPÔT (1926), LTD.—Winding up voluntarily. Liquidator, Mr. H. Cunningham, Angel Street, Sheffield. A meeting of creditors was held at the Law Society's Rooms, Bank Street, Sheffield, on June 18th. Particulars of claims by July 19th.

GAS & ELECTRIC SECURITIES, LTD.—Liquidator, Mr. E. T. A. Phillips, Official Receiver, Carey Street, W.C., released June 6th.

Private Arrangements.

L. E. JONES, 193, Fawcett Road, Southsea, Portsmouth, electrical engineer.—A meeting of creditors was held on June 12th at the offices of Messrs. Poppleton, Appleby & Hawkins, 4, Charterhouse Square, E.C., when Mr. E. H. Hawkins stated that the liabilities amounted to approximately £396, and the net assets to £162. The debtor commenced business in 1922, with his brother, who took over a business which had been previously carried on. In 1927 the brother withdrew, and the business was continued by the debtor. The turnover last year was approximately £1,400. There had been several summonses issued, and one creditor was in a position to sign judgment, and the debtor had executed a deed of assignment to Mr. Hawkins in order to protect the estate. The creditors decided that, provided the debtor deposited £100 with Mr. Hawkins within the next 14 days, they would accept that amount, to be distributed *pro rata* in settlement of their debts. Meantime, the estate would be protected under the deed of assignment with Mr. Hawkins as trustee. The following are creditors :—

	£		£
Compton Technique ...	35	Electric Cables, Ltd. ...	22
Eaton & Sons	21	Shaw, J., & Sons	37

G. N. JENKINS, 195a, Earl's Court Road, S.W.5, electrical engineer, &c.—A meeting of creditors was held recently, when a statement of affairs was submitted showing liabilities of £963 and net assets of £710, leaving a deficiency of £253. The debtor commenced business in 1918, taking over an existing concern. He had traded mainly at a loss. He had no private assets, but in addition to the items in the statement of affairs, it was reported that there was work in hand from which some balance might accrue. A deed of assignment had already been executed in favour of Mr. A. H. Partridge, 3, Warwick Court, Gray's Inn, W.C., and this was confirmed.

C. L. F. JONES, electrical and wireless engineer, Colwyn Avenue, Rhos-on-Sea, and 14, Mostyn Street, Llandudno.—At a recent meeting of creditors it was stated that a deed of assignment was executed on May 13th last in favour of Mr. A. Sandford, Rhos Road, Rhos-on-Sea. The unsecured liabilities were returned at £708, against net assets of £235. It was believed, however, that the deficiency would only amount to £422. The creditors passed a resolution confirming the deed, subject to cash creditors for £180 withdrawing their claims. A committee was also nominated consisting of the representatives of Metro-Vick Supplies and the B.N.B. Wireless Co., Ltd. It was stated that the cash creditors were willing to withdraw their claims, with the result that the deficiency would be reduced to £242.

United States Radio Prices.

The *Manchester Guardian* says that a general reduction in the price of radio sets in America should follow the statement of an official of the Radio Manufacturers' Association at the annual trade show in Chicago. He predicts that in a few days the Radio Corporation of America will require royalties on only the radio "chassis," and not on the complete set, from its licensees. The plan will be retrospective as from April this year, and will mean a reduction of about 50 per cent. in some cases. The royalty hitherto has been 7½ per cent. on the complete receiver. According to advices from sales managers from all parts of the country this year's demand for sets will be greatly increased. Already orders exceeding £19,000,000 have been received. Last year about 2,000,000 new receiving sets were manufactured. The estimate for the 1929-30 season is 2,800,000.

Our Foreign Electrical Trade.

The following table shows the values of exports and imports of electrical goods and machinery during May, 1929 :—

	May, 1929.	Inc. or dec. as compared with May, 1928.	5 months 1929. Inc. or dec.
Exports—	£	£	£
Electrical goods and apparatus	1,288,888	+296,207	+281,634
Machinery	5,527,880	+871,500	+528,611
(Inc. electrical machinery)	561,356	− 45,213	−110,357
Imports—			
Electrical goods and apparatus	434,557	+113,672	+334,412
Machinery	1,802,323	+429,869	+754,060
(Inc. electrical machinery)	184,128	+ 37,000	+ 15,645
Re-exports—			
Electrical goods and apparatus	22,779	+ 10,386	+ 9,003
Machinery	168,969	+ 14,385	+ 21,132
(Inc. electrical machinery)	13,928	+ 1,107	− 7,712

Social Events.

The third annual outing of the staff of Messrs. Robert Hornby & Co., Ltd., took place on June 15th. Some 60 members of the staff and friends travelled to Brighton by special saloon coaches. On arrival a visit was made to the recently re-opened Aquarium. After luncheon, Mr. A. O. Rixon proposed the toast of the chairman of the company, Mr. Hornby, in responding, referred to the co-operation which existed between the indoor and outdoor staffs and believed that this had a great deal to do with the success of the company. The toast of "The Representatives" was proposed by Mr. J. W. Brooks and responded to by Mr. Kilpatrick, the Scottish representative. Mr. Greaves proposed the health of the Visitors, and Mr. H. Porter Cox replied. The afternoon was spent in a series of bowls contests, which were thoroughly enjoyed. Altogether it was a very successful and enjoyable reunion, well carried out by the organiser, Mr. E. G. Meadows.

The seventh annual sports and gala of Messrs. Siemens Bros. and Co., Ltd., were held on June 15th at the company's sports ground, Park Lane, Charlton. Although the weather clerk was not so considerate as in previous years, heavy clouds threatening rain, the weather remained dry, and a large gathering of employés and friends were present to witness the events and to give vocal encouragement to the competitors. The friendly rivalry between the various departments was very keen, and exciting finishes were the order of the day. The programme was a large one, numbering 52 events, and the strict adherence to the time table reflected credit on the organisers. To those who desired a change from the excitement of the arena, side-shows offered many diversions and were well patronised. Sir William Bull, Bart., accompanied by Lady Bull, presented the prizes, which included many cups and medals, and they received a warm welcome. Music was provided during the afternoon by the Greenwich Royal Hospital School Band, and the proceedings were brought to a conclusion with an excellent concert given by "The Escalators" concert party.

The staff of Siemens Lamp Works, Preston, recently held an 18-hole medal play competition on the links of the Dick, Kerr Club at Ashton Park. The competition was for the "Dr. Wright Prize," and the successful competitors were Messrs. S. Facer (75), W. Higginson (77) and J. W. Laurence (82).

The Midland Electric Manufacturing Co., Ltd., attained its majority during the current year, the company having been incorporated in 1908. The occasion was celebrated by several functions. There was a dinner at the Midland Hotel, at which all the executive staff and outside representatives were present, followed by a musical evening, at which there were present five of the small band who helped to found the company, and are still with it. There were also present about 50 who had been employed by the firm for 10 years and over, to whom commemorative presentations were made. On the following day, by invitation of Mr. W. L. Barber, the founder of the firm and managing director, a visit was paid to his country house in Wyre Forest, one of the beauty spots of the Midlands.

Proposed German Tariff Reductions.

Under an arrangement additional to the German-Swiss commercial treaty, it is proposed to reduce the duties of a number of articles upon importation into Germany. The duty on automobile headlights is to be 120 Reichsmarks per 100 kg.; and that on "dynamos and magneto dynamos for motor vehicles and stating motors for combustion engines" is to be reduced to 110 Rmk. per 100 kg. The duties on electric cooking apparatus are to be as follows :—Appliances weighing more than 100 kg. and up to 500 kg. : 50 Rmk. per 100 kg.; weighing more than 500 kg. : 40 Rmk. per 100 kg. The duty on "magnetic ignition apparatus" is fixed at 160 Rmk. per 100 kg. In the list of reciprocal reductions in the Swiss tariff there is a new note providing that dynamos and electric starters and combinations of these are not to pay more than 110 fr. per 100 kg.; and "dynamo-magnets and magnetos for sparking" are not to pay more than 170 fr. per 100 kg.

New Catalogues and Lists.

IGRANIC ELECTRIC CO., LTD., 149, Queen Victoria Street, E.C.4.—Leaflet No. 1701 drawing attention to "RM" type solenoid operated brakes for a.c. and d.c. service.

D.P. BATTERY CO., LTD., Bakewell, Derbyshire.—A well-produced and illustrated booklet dealing with "Kathanode" traction cells and indicating the many purposes for which the batteries are employed.

MESSRS. ROBEY & CO., LTD., Globe Works, Lincoln.—Pamphlet No. 513, containing illustrations of the company's products, including steam and oil engines, boilers, water heaters, &c.

MESSRS. D. H. BONNELLA & SONS, LTD., 46 and 48, Osnaburgh Street, N.W.1.—A catalogue of motor-car accessories, including roof lamps of many designs, dashboard lamps, inspection lamps, switches, &c. Illustrated and priced.

MULLARD WIRELESS SERVICE CO., LTD., Mullard House, Denmark Street, W.C.2.—Leaflet No. VT. 13/1a, illustrating silica transmitting valve type RO/2.5 kW, and Leaflet No. W.A. 22, dealing with Mansbridge condensers.

HARLAND ENGINEERING CO., LTD., 196, Greengate, Manchester.—List No. X. 64/283, illustrated and priced, giving particulars of ironclad distribution fuseboards.

MICA MANUFACTURING CO., LTD., Bromley, Kent.—A catalogue of mica, micanite and bakelite insulating material, describing the uses to which this insulation can be applied. A price list is included.

MESSRS. J. STONE & CO., LTD., Deptford, S.E.14.—An illustrated card giving particulars of copper furnace pans or washing coppers.

PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2.—List No. 213 of Philips automobile lamps giving reduced prices.

LONDON ELECTRICAL CO., 1, Sherborne Lane, King William Street, E.C.4.—Four pamphlets dealing with "Ritsema" and "Goblin" vacuum cleaners, "Con-venient" lamp fittings, electric fans, and "Rayflect" daylight signs. Illustrated and priced.

AGRICULTURAL & GENERAL ENGINEERS, LTD., Aldwych House, Aldwych, W.C.—A booklet entitled "Plucking by Machine," published by the associated company, Messrs. E. H. Bentall and Co., Ltd., and dealing with the Bentall-Kingdon method of plucking poultry.

GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—Leaflet F 4977, illustrating G.E.C. Bakelite pendants. Priced.

DRAYTON REGULATOR & INSTRUMENT CO., LTD., West Drayton, Middlesex.—Two descriptive pamphlets dealing with the "Union" recording calorimeter, and the M.S. time-temperature regulator.

WHOLESALE ELECTRIC LAMP CO., LTD., 37, Vauxhall Bridge Road, S.W.1.—Illustrated leaflet giving particulars of the revised prices of "Royalstone" fittings.

XETAL PRODUCTS, LTD., King Street, Long Eaton, Nottingham.—A pamphlet drawing attention to Xetal impregnated transmission and conveyor belting, and including a price list.

DRAKE & GORHAM, LTD., Rockingham Works, Newington Causeway, S.E.1.—Descriptive List No. 102, dealing in an interesting manner with e.h.p. ring main controllers and "Metesco" oil switch fuses.

FERRANTI, LTD., Hollinwood, Lancs.—A well-produced catalogue illustrating the company's fires, and including a new price list.

MESSRS. GEO. BRAY & CO., LTD., Leeds.—Catalogues Nos. C.3A, C.4, and C.5, drawing attention respectively to Chromalox immersion heaters, radiators, and heating units. Illustrated and priced.

MESSRS. GENT & CO., LTD., Faraday Works, Leicester.—Leaflet 35f, illustrating and describing "Pul-syn-etic" electric impulse clocks and "time discipline" apparatus. Priced.

P.O. Employés and the Merger.

The *Daily Herald* reports that the opposition of the Post Office Engineering Union to the transfer of beam and wireless employés from the State to the Imperial Communications Company was referred to in a report submitted to the conference of the union at Glasgow on June 12th. It was stated that very few of these employés had taken advantage of the option to transfer. The terms offered by the company were not so good as those recognised by the State and were condemned as inadequate by the union. The Union of Post Office Workers and the Post Office engineers were still negotiating with the company in the hope of getting more satisfactory terms.

The F.B.I. and Australian Trade.

Following upon a study of the report of the recent Economic Mission to Australia, led by Sir Arthur Duckham, K.B.E., the Executive Committee of the Federation of British Industries has made a number of recommendations with regard to Anglo-Australian trade. In the first place the Economic Mission is requested to convey to the proper quarters in Australia an expression of the hope that representatives of primary producers and industrialists from Australia will visit Great Britain in the near future, for the purpose of investigating the possibility of increasing the sale of Australian primary products in the United Kingdom, and the capacity of Great Britain to supply Australia with those goods which she is not in a position to manufacture herself. The F.B.I. places its organisation at the disposal of such visitors. It is also suggested that individual trades should consider the desirability of sending representatives to Australia, with the object of examining the question of what types of goods can, with economic advantage, be manufactured in Australia, and of exploring the possibility of British initiative and capital co-operating in this direction. In the case of goods which Australia would not be capable of manufacturing economically and would consequently have to import, these representatives, it is hoped, would be able to prove that Great Britain was fully capable of supplying them and that it was to the interest of both countries that on these goods a substantial and effective preference should be granted to British manufacturers. Finally, the Federation expresses the hope that no opportunity will be lost by His Majesty's Government of following up the valuable work performed by Sir Arthur Duckham's Mission, with special reference to the question of facilitating trade between the two countries and of endeavouring in collaboration with the Australian authorities to reconcile any divergence of interest.

Trade Announcements.

Messrs. ROUCH & PENNY, electrical engineers and contractors, have removed to larger premises at 8, Old King Street, Broadmead, Bristol. They ask for up-to-date catalogues.

The ELECTRIC HOMES CO., dealers in electric lighting fittings and domestic appliances, have opened premises at 73, Park Street, Bristol.

The CLEAN COAL CO., LTD., has removed to Medway House, Horseferry Road, S.W.1.

New offices and works are being erected for the PYRENE CO., LTD., on the Great West Road, Brentford.

The Nottingham branch of PHILIPS LAMPS, LTD., is being removed to larger premises, on June 24th, at Trivetts Square, Short Hill, Nottingham. (Telephone: 40581, as before.)

It is announced that the business of EDWARDS & ARMSTRONG, LTD., electrical engineers and contractors, has been merged as from May 31st with the Western Electricity Supply Co., Ltd., whose head office is at Cainscross, Stroud.

Messrs. DRAKE & GORHAM, LTD., state that Messrs. Pooley and Austin, 34, Broadway, Westminster, S.W.1, are their agents for the sale of e.h.p. and l.p. switchgear in London and the South-Eastern Counties.

Messrs. GEORGE ELLISON'S Manchester branch office is now at No. 1, Dickinson Street. The telephone number (City 5964) and telegraphic address ("Starters Manchester") are not altered. A representative selection of Ellison switchgear has been arranged for inspection in these new offices.

Book Notices.

"*Journal* of the Institution of Electrical Engineers," Vol. LXVII., No. 390. June, 1929. London: E. & F. N. Spon, Ltd. Price 10s. 6d.

"Blue Print Reading," by W. W. Sturtevant. Pp. xi+135; 64 figs. Price 9s. 6d. net; "Direct-Current Electricity," by L. Raymond Smith. Pp. xi+262; figs. 272. Price 10s. net. London: McGraw-Hill Publishing Co., Ltd.

"Memoirs of the College of Engineering, Kyoto Imperial University." Vol. VI, No. 1, March, 1929: "Theoretical and Experimental Researches on Electric Resistance Welding."

Australian-American Trade.

The May *Journal* of the British Empire Chamber of Commerce in the United States of America reports that the Australian Government has submitted to the State Department at Washington, through the British Embassy, a memorandum setting forth certain existing inequalities in the commercial dealings of the two countries, and to the strong disinclination of the Australian people to submit quietly to an aggravation of this condition by the imposition of higher American duties. The memorandum, which is quite definite and precise, points out that trade between the Commonwealth and the United States is already excessively one-sided, that the adverse balance —now in excess of $111,000,000—is increasing, and that changes in the American tariff, calculated to still further reduce imports from Australia, will mean the diversion of Australian trade from the United States to other countries.

Local Exhibition.

WELLINGBOROUGH.—The Northampton Electric Light and Power Co., Ltd., and its two associated companies, the Wellingborough Electric Supply Co., Ltd., and the Rushden and District Electric Supply Co., Ltd., provided an admirable exhibition at the recent Northamptonshire County Agricultural Show, Wellingborough. The show occupied a very suitable site by the side of the main Wellingborough-Northampton road. The arrangements were carried out by Mr. W. E. Watson, A.M.I.E.E., who was in charge. The stand demonstrated the uses of electricity for agriculture, farming, and in the home. Apparatus was loaned by the Wolseley Sheep Shearing Machine Co., Ltd., Messrs. Drake & Gorham (electrical pumps), the British Thomson-Houston Co., Ltd. (portable farm motor), and Young, Osmond & Young (greenhouse and tubular heaters). Chaffcutters, milk separators, &c., were supplied by Messrs. Ennals & Cooper, Northampton. Electric cookers, hot-water apparatus, cleaners, ironing and washing machines and other domestic apparatus were well displayed. Use was made of E.D.A. and other posters.

Marconi House to be Sold.

Consequent upon the cable-wireless merger, Marconi House, Strand, is being offered for sale.

Recent Contracts.

An order has been placed by the Racecourse Betting Control Board with the D.P. BATTERY CO., LTD., for six 100-V, 500-ampere-hour "Kathanode" batteries for operating Totalisators, which will be mounted on lorries for transport to and from different racecourses.

Park Royal Hospital has just been equipped with a specially designed "Marconiphone" radio installation. Seventy loud speakers and 400 headphones are provided, and in addition to radio programmes, gramophone record recitals are possible by means of a pick-up.

Trade with Belgium.

The British Consul at Liége (Mr. F. O'Meara) has furnished the Department of Overseas Trade with a confidential memorandum on some aspects of trade and industry in Eastern Belgium, with particular reference to the appointment of agents in this market. Copies of the memorandum may be obtained by any United Kingdom firms interested, on application to the Department.

South African Mines' Imports.

According to the *South African Mining and Engineering Journal*, last year the South African mines purchased imported goods valued at £6,473,922 (in addition to local products valued at £11,268,061). Of this total, electrical machinery accounted for £483,081, and electrical machinery, spares and fittings for £156,347. The value of the electrical energy purchased during 1928 is given as £1,816,971.

Cables at the Newcastle Exhibition.

BRITISH INSULATED CABLES, LTD., states that it supplied, laid and jointed the whole of the cables for power and lighting at the North-East Coast Exhibition, Newcastle.

Unemployment.

A decrease of 32,181 in the number of registered unemployed was recorded for the week ended June 3rd. The total at that date was 1,100,100, as compared with 1,132,281 on May 27th, and 1,160,049 on June 4th, 1928.

Deed of Assignment.

F. THORNTON (T. Thornton & Co.), electrical engineer, 8, Croft Street, Burnley.—Particulars of claims by June 22nd to the trustee, Mr. F. Clarkson, Bank Chambers, 7, Hargreaves Street, Burnley.

An E.T.B.I. Competition.

A competition of a somewhat novel character is being organised by the Electrical Trades Benevolent Institution. We hope to give some particulars of the competition, and of the many prizes which are being awarded, in an early issue.

An Illumination Design Course.

The 19th Illumination Design Course which was held in London last week proved to be the most successful of the series. Representatives of the electrical contracting industry predominated, there being 50 of them. There were 46 manufacturers' representatives and 24 from supply authorities.

Wireless Apparatus for Italy.

It is reported from Genoa that owing to certain developments in connection with broadcasting an active demand has arisen for wireless sets, and that Italian manufacturers have been unable to cope with it. While German and American firms have been busy in endeavouring to supply this demand, it is said that the British wireless apparatus industry is not as widely represented in that part of Italy as the situation at present warrants. Alternating current sets should be supplied. Condensers and loud speakers are imported separately, as also are valves and headphones.—*The Times Trade and Engineering Supplement.*

Glasgow Rate Increases

The Glasgow valuation roll shows, *inter alia*, that as a result of the recent reassessments of property the ratable value of the electricity undertaking has been increased by £49,276 to £268,642; that of the tramways by £10,973 to £200,983; and that of the Clyde Valley Electrical Power Co. by £1,956 to £42,174.

New French Company.

A company has been formed at Douai, with a capital of two million francs and the title La Société des Secteurs Electriques du Nord et du Pas de Calais, to extend the electricity distribution systems in those Departments.

German Foreign Electrical Trade.

The imports of electrical machinery, apparatus and fittings into Germany during the first three months of this year attained a value of £587,700, as compared with £584,100 in the corresponding quarter of 1928. The exports of similar material of German manufacture advanced during the same periods from £5,888,250 to £6,581,950.

For Sale.

Messrs. Flick & Son will sell by auction at the power station, Orford, on June 28th, electrical plant and equipment consequent upon the dismantling of the station. (See our advertisement pages to-day.)

Prices of Materials.

Messrs. James Forster & Co., reporting on June 15th, stated that the lead market last week was very quiet, transactions being mainly professional. Demand from consumers has not been active, though a fair consumption is taking place, most of the buying being of a hand-to-mouth character. Arrivals have not been quite so plentiful recently, so that early lead is in demand, but it is anticipated that considerable quantities will arrive during the next six weeks. There seems nothing in the position to anticipate any great movement either way in the near future. The Board of Trade returns for May show:—Imports, 26,483 tons; exports, 3,912 tons; leaving for home consumption, 22,571 tons.

Messrs. F. Smith & Co. report, June 18th: Copper (electrolytic) bars, £84 10s., 5s. dec.; do. do. sheets, no change; do. do. wire rods, £94 10s., 5s. dec.; do. do. h.c. wire, 11¼d., 1/16d. dec.

Messrs. James & Shakespeare report, June 18th: No change in copper bar, sheet and rod, or English pig lead.

Messrs. Edward Till & Co. report, June 18th: India-rubber, Para fine, 11d., ¼d. dec.

Lighting and Power Notes.

Bradford.—LOAN.—The Corporation Electricity Committee is seeking sanction to a loan of £5,000 for the erection and equipment of a transformer chamber at Harrogate Road.

Blackpool.—LOANS.—The Corporation has received sanction to a loan of £8,000 for the purchase of cookers, &c., to be let out on hire. Application is to be made for sanction to a loan of £25,000 for a change in the frequency of supply.

Birkenhead.—LOAN.—Application is to be made by the Corporation Electricity Committee for sanction to a loan of £5,966 for the supply of electricity to Puddington and Burton.

Burton-on-Trent.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. T. Hall) for the year ended March 31st last show a total income of £110,839, as compared with £97,173 in the preceding year. Working expenses amounted to £56,359, as against £48,703, leaving a gross profit of £54,530 (£48,470). After providing for loan charges, &c., and capital expenditure charged to revenue, there was a net surplus of £3,374, as compared with £6,152 in 1927-28. A contribution of £3,175 was made to the borough fund. The electrical energy sold increased from 17,334,309 to 21,062,528 kWh, and the maximum supply demanded from 6,100 to 7,750 kW. The average price obtained per kWh fell from 1.31d. to 1.22d. The additional load connected during the year amounted to 3,011 kW, of which the domestic load accounted for 2,303 kW.

Clayton.—COOKER HIRING AGREEMENT.—The Urban District Council recently approved a recommendation that the Electricity Committee should enter into an agreement with Bradford Corporation Electricity Department—subject to confirmation by Bradford City Council—for hiring electric cookers at Clayton on a yearly instalment system. The agreement is subject to reconsideration in two years if Clayton is not by that time incorporated with Bradford.

Continental.—RUSSIA.—The Expert Committee of the Central Electrotechnical Council has approved a scheme for the construction of a power station in the vicinity of the Mt. Visheri, which will include four turbo-generators, each of 70,000 kW. It is proposed to use peat as fuel, the resources of which are stated to be sufficient to last for 40 years. The energy from the new station will be transmitted to Leningrad along a line about 84 miles in length, at a pressure of 220,000 V. It is intended to convey the peat a distance of approximately 28 miles to the site of the generating station by means of an electric railway. Work on the station will be begun this year, and is expected to be completed in six years, the total expenditure being estimated at 101,000,000 roubles. Next to the Dnieper station, now in course of construction, the new station will be the largest in the country.

ITALY.—A concession has recently been granted for the establishment of a station near Terni to utilise the water power of the River Velino. It is estimated that 146,000 h.p. is available.

AUSTRIA.—In a recent issue of *Electrotechnik und Maschinenbau*, of Vienna, the subject of utilising the power for electricity generating purposes of that portion of the River Danube in Austrian territory is dealt with. A scheme is suggested for the construction of 13 hydro-electric stations which would be capable of supplying 5,450 million kWh per annum.

It is estimated that a minimum of 626,000 h.p. would be available throughout the year.

FRANCE.—Work has recently been commenced by the Société des Forces Motrices du Vercors and the Société Générale de Force et Lumière on the establishment of a new hydro-electric station on the River Isère at Pizancon. The plant will have an output of 150 million kWh per annum.

Croydon.—MAINS EXTENSIONS.—The Corporation Electricity Committee is to extend mains at a cost of £1,367.

PURCHASE OF APPARATUS.—The Corporation Electricity Committee has authorised the expenditure of £11,000 for the purchase of apparatus for hire.

POWER STATION SITE EXTENSION.—The Corporation has made application to the Electricity Commissioners for sanction to extend the site of its generating station by the addition of various adjacent lands.

Darlington.—REVISION OF CHARGES.—The Corporation Electricity Department has introduced the following new scale of electricity charges:—Lighting: ½d. per kWh during the lighter eight months, and 3d. per kWh during the darker four months, as against the former charge of 1½d. per kWh for the lighter months, and 1½d. per kWh during the darker months for half the electricity consumed during the lighter months and 3½d. per kWh for the remainder. Heating and power: 1½d. per kWh during the darker four months and ½d. per kWh for the lighter eight months. Power: (A) £2 12s. 0d. per kW of maximum demand and ½d. per kWh for electricity consumed; (B) 1d. per kWh for 2,000 kWh per quarter and 11/16d. per kWh for the remainder. Lighting, heating or power between 11 p.m. and 7 a.m.: Time switch charge plus ½d. per kWh. Outside electric signs from dusk to 10.30 p.m.: 2d. per kWh during the darker months and ½d. per kWh during the lighter months. Late shop window lighting: 1½d. per kWh during the darker months, and ½d. per kWh during the lighter months. Where the supply is d.c. the above power charges are increased by 5 per cent., and where the power factor is less than 0.8 an additional charge of 30s. per annum is made for each kVA by which the demand in kVA multiplied by 0.8 exceeds the demand in kW. There are also special charges for unconverted e.h.p. supply and for lighting where the latter demand does not exceed 20 per cent. of the maximum power demand.

Dewsbury.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £7,164 in connection with the new Infirmary and district electricity scheme.

Grange-over-Sands.—LOAN SANCTIONED.—The Urban District Council has received sanction to a loan of £5,000 for electricity extensions, which will enable the Council to complete the mains to all parts of the district.

Hastings.—ELECTRICITY SUPPLY.—The Corporation Electricity Committee has arranged to provide a supply of electricity to Staplecross Village and Cripps Corner at a cost of £5,362.

LOANS SANCTIONED.—The Corporation Electricity Committee has obtained sanction to loans of £2,500 for services and £1,500 for transformers.

Kendal.—LOANS.—The Town Council has received sanction to a loan of £5,000 on account of the sum required for feeder and distributing mains, and a further loan of £10,000 for a similar purpose has been applied for.

ELECTRICITY SUPPLY SCHEME.—The Council has appointed Mr. J. E. Storr to prepare a scheme for the transmission and distribution of electricity over the area covered by the South Westmorland Rural District Council, with the exception of the district covered by the Order of the Windermere and District Electricity Supply Co., Ltd.

Liverpool.—YEAR'S WORKING.—We have received a copy of the accounts of the city electricity undertaking (engineer: Mr. P. J. Robinson) for the year ended March 31st last. The total revenue amounted to £1,350,688, as compared with £1,288,038 in the preceding year. Working expenses and special charges against revenue totalled £754,021, as against £814,155, and there was a gross profit of £596,667 (£473,883), to which was added a contribution of £3,290 to the sinking fund by the Housing Committee, making a total of £599,957 available. This was disposed of as follows: Interest, £248,825; repayment of loans, £533; contribution to Bootle Corporation stock redemption fund, £1,485; sinking fund contribution, £188,286; contribution to city rate, £50,000; renewal fund, £110,827. The capital expenditure during the year amounted to £833,529, and included £340,927 for lands, £252,534 for machinery, and £243,959 for mains. The total spent on the undertaking is now £7,482,866.

London.—ST. PANCRAS.—The Electricity and Public Lighting Committee has recommended the extension and replacement of mains at an estimated cost of £11,480, and that application be made to the Electricity Commissioners for sanction to a loan for this work.

Northern Ireland.—HOLYWOOD, CO. DOWN.—The Town Council has decided to apply for sanction to a loan of £10,000 for electricity services.

CLONES (CO. MONAGHAN).—At a meeting of the Clones Electric Light & Power Co., Ltd., held recently, it was announced that the company had come to terms with the Electricity Supply Board, and as a result the shareholders would receive £1 11s. for each £1 share. The Electricity Supply Board has taken over control of the undertaking as from June 1st.

Norton.—OBJECTION TO ORDER.—The Rural District Council Council has decided to make formal objection to the application of the Holderness Trust, Ltd., for a Special Order to supply electricity within the Council's area on the grounds that there is only a small number of villages which could be supplied, and that the time allowed for consideration of the Order was not sufficient. The Council has also decided to call a conference of local authorities concerned, with a view to concerted action. The clerk states that the Northern Counties Electricity Supply Co., Ltd., which had been granted powers for the supply of electricity within the Norton urban and rural districts and was preparing a scheme, also intended to object to the application.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

CORWEN.—*Corwen Electric Light Co.*—Power: From 4d. to 1½d. per kWh.

STAMFORD.—*Urban Electric Supply Co.*—Lighting: To 9d. per kWh. Power: 3d. per kWh. Domestic heating: 2d. per kWh. The reductions are subject to the Town Council accepting the suggestions of the company to grant it a monopoly for 40 years.

WINCHESTER.—Lighting: Flat rate, from 7d. to 6½d. per kWh. Prepayment meters, from 7½d. to 7d. per kWh. Business lighting: From 9d., 5d., and 2d. per kWh to 9d., 4d., and 2d. Ratable value and maximum demand tariffs to be discontinued, and instead the following two-part tariff to be adopted: Living rooms assessed at a fixed charge of 3s. per room per quarter for the summer quarters, and 6s. per room per quarter for the winter quarters, plus a flat rate of 1½d. per kWh.

GLASGOW.—Two-rate tariff: Primary rate 6d. per kWh, secondary rate ¾d. per kWh. Commercial lighting: Primary rate 6d. per kWh, secondary rate 1d. per kWh, the primary rate to be based on 600 hours' use per annum of the maximum demand for lighting, with a minimum of 60 kWh. Industrial power:—Small power rate: Primary rate 2d., secondary rate 1d. per kWh. Large power rate: 1½d. for first 100,000 kWh, 1d. for second 100,000 kWh, and ¾d. per kWh above. A new domestic tariff has also been introduced.

BURY ST. EDMUNDS.—Domestic lighting: From 6½d. to 6d. per kWh, less ½d. per kWh discount, making 5½d. net. Power: Consumption up to 2,500 kWh per quarter 3¾d. per kWh, less 20 per cent., instead of 5½d. per kWh up to 500 kWh per quarter. Business premises (alternative tariff): £15 per annum per kW, plus 1½d. per kWh.

CARSHALTON.—*Correction.*—In our note under this heading in our issue of June 7th, we gave the name of the supply authority as the South Metropolitan Electric Light & Power Co., Ltd. This, of course, was incorrect, as the South Metropolitan Electric Tramways and Lighting Co., Ltd., is the supply authority for the Carshalton area.

South Africa.—CAPETOWN.—According to Mr. Geo. H. Swingler, the city electrical engineer, the electricity undertaking was inaugurated in 1895, and the present Dock Road power station was opened in 1904 with an installed capacity of 2,000 kW. To-day the total capacity of the plant is 28,500 kW, including two 3,000-kW and three 7,500-kW turbo-alternator sets. In 1928 the electrical energy generated was 53,727,896 kWh more than in 1917. Apart from transformer pillars and similar distribution points, there are 55 sub-stations in operation, and the 7,900 street lamps in use have a combined candle power of 770,000. The number of meters in service exceeds 30,700.

Special Orders.—The Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them authorising the Electrical Distribution of Yorkshire, Ltd., to supply electricity in the urban district of Cudworth and the township of Billingley; Bristol Corporation to supply electricity in parts of the rural districts of Chipping Sodbury, Thornbury and Keynsham; and the Power Development Co. to supply electricity in the urban districts of Crewkerne and Ilminster and parts of the rural districts of Chard, Yeovil and Beaminster.

St. Helens.—NEW ELECTRICITY CHARGES.—The Electricity Committee has adopted the following new scale of domestic charges:—Premises having a ratable value of £40 and under, a fixed charge of 10 per cent. per annum on the ratable value, plus 0.9d. per kWh; premises having a ratable value of over £40, a fixed charge of 12½ per cent. per annum on the ratable value, plus 0.9d. per kWh, with a minimum annual payment of £2 10s.; as an alternative, a fixed charge of 20 per cent. per annum on the ratable value, plus ½d. per kWh, with a minimum payment of £4 per annum.

Stokesley.—ELECTRICITY SUPPLY.—At a recent meeting of the Rural District Council it was stated with regard to the proposed electricity supply to the Cleveland area of Great Ayton and Stokesley by the Cleveland and Durham Electric Power, Ltd., that the Corporation of Thornaby was insisting that a portion of the trunk line to Stokesley running through the

outskirts of the borough should be laid underground where it crossed roads, while Great Ayton Parish Council demanded that all-metal standards instead of wooden posts should be used in the village. The clerk expressed the fear that the objections would hold up the supply of electricity to the area proposed, and stated that the company was not prepared to place the cables underground in the Thornaby area as it was complying with Government regulations in taking the cables over highways not much used. It was decided to defer the consideration of the plans presented by the power company, pending a reply from the Electricity Commissioners, to whom a protest had been sent.

Winslow.—ELECTRICITY SUPPLY.—The Rural District Council has approved a scheme submitted by the Northampton Electric Light and Power Co., Ltd., for a supply of electricity. It is hoped to obtain a supply by next winter.

Worksop.—SPECIAL ORDER.—The Urban District Council has applied for a Special Order to include Whitwell in its area of supply. There are about 40 prospective consumers, and the cost of the scheme will be £8,689.

LOAN.—The Council has applied for sanction to a loan of £13,652, part of which is for a main transmission line linking Manton Colliery with Rhodesia, which will pass close to Whitwell.

Tramway and Railway Notes.

Birmingham.—CAR RENOVATION.—It is proposed shortly to recondition a further 500 of the Corporation's tramcars. The renovations include the use of chromium-plated fittings and attractive upholstery. Special lighting arrangements will be installed.

Burton.—TRAMWAY ABANDONMENT.—At a meeting of the Town Council held on June 13th, it was decided to discontinue the tramway services and replace them as soon as possible by 'buses. It was stated that since the tramways were inaugurated 25 years ago the ratepayers had had to make good losses amounting to £66,000. Furthermore, had the tramway services been continued, a further sum of £28,000 would have had to be spent on renewals, with no hope of meeting expenses.

Cardiff.—EXTENSION OF TIME.—The Corporation is to make application to the Ministry of Transport for a prolongation of time to July 29th, 1930, within which to construct Tramway No. 4.

Continental.—FRANCE.—It is reported by the Paris correspondent of *The Times* that a proposal to abolish four further lines of Paris tramways and to substitute for them motor-omnibus services was adopted by the Permanent Traffic Committee on June 13th. The lines which are thus to disappear are those which connect La Muette, Boulogne, Neuilly-Saint-James, and Charlebourg with the Madeleine; all cross the section of the city where the traffic is at its heaviest. Their abolition is part of a general programme to abolish tramways on the main routes and to remove the tramway termini from the centre of the city. The Director of Traffic at the Prefecture of the Seine, explains that wherever it is possible to substitute a service of motor-omnibuses for tramways this is being done, and every effort is being made gradually to restrict the latter to the areas outside the outer Boulevards. Whereas in 1923 the tramways and motor-omnibuses carried more passengers than the "Metro" or Underground railway, the latter now carries in the year 140,000,000 passengers more than the two together. Schemes for the reorganisation of Parisian traffic as part of a scheme for the rearrangement of the administration of the city are now being prepared, and the whole question of the tramways in their relation to traffic is being reviewed.

HOLLAND.—The authorities of the Dutch Railways recently decided to proceed with the electrification of the railway between Amsterdam, Uitgeest, and Alkmaar in North Holland and with the branch line between Uitgeest and Velsen.

Doncaster.—RAILLESS CARS.—The Town Council has decided to convert three tramway routes to the railless-car system, with an extension along Carr House Road to connect with the Racecourse route.

Glasgow.—PINKSTON STATION.—The Corporation Tramways Sub-Committee on Works and Stores on June 12th decided to recommend that tenders should be invited for the reconditioning of the plant at Pinkston power station at an estimated cost of £200,000. Recently the Electricity Commissioners refused permission to the Tramways Committee to extend the plant, the cost of that scheme being £237,000. The view was expressed at the sub-committee meeting that the Commissioners had no powers to prevent the Department from reconditioning existing plant so long as no actual extensions were made.

Greenock.—TRAMWAY ABANDONMENT.—The Minister of Transport has authorised the abandonment of the tramway system of the Greenock and Port Glasgow Tramways Co., and the substitution of 'bus services as from July 16th, 1929.

Haslingden.—PROPOSED TRAMWAY ABANDONMENT.—At a meeting of the Town Council, held recently, the Town Clerk reported on a conference of the joint representatives of Haslingden, Accrington, and Rawtenstall Corporations regarding the joint tramway undertaking and the substitution of omnibuses. The urgency of the question had been impressed on the representatives of Accrington and Rawtenstall, who said that their Councils had not yet considered the matter. The Town Clerk was instructed to obtain consent for the running of omnibuses by Haslingden Corporation between Accrington and Bacup.

Northern Ireland.—BELFAST.—At a meeting of the City Council held recently, reference was made to the accounts of the tramway undertaking for the year ended March 31st last. In spite of a heavy loss of revenue due to competition of privately-owned 'buses, the undertaking was able to end the year with a profit. When the private 'buses were taken over on December 5th last the actual deficit on the trading of the undertaking up to that date amounted to £18,140, and the trams were being run at a loss of £2,000 a week. Had the Tramways Committee been unable to check this weekly loss there would have been at the end of the financial year a loss of £48,000, instead of which the final accounts showed a profit of £10,404.

Southport.—YEAR'S WORKING.—We have received from Mr. T. J. Kendrew, general manager of the Corporation tramway undertaking, a copy of his report, together with a statement of accounts for the year ended March 31st last. The total revenue was £71,172, as compared with £75,057 in the previous year. Working expenses totalled £54,562, as against £57,756, leaving a gross profit of £16,610 (£17,300). After providing for capital charges there was a net surplus of £5,709, as compared with £3,544 the previous year. The number of passengers carried decreased from 13,489,878 to 12,896,830, but the car miles run increased from 1,186,337 to 1,197,326. The total revenue per car mile fell from 15.184d. to 14.266d.

Telegraph and Telephone Notes.

Bolivia.—COMMUNICATION SERVICES.—It is estimated that there are now 6,986 miles of telegraph wire in operation in Bolivia, or only 2.7 miles per 1,000 inhabitants. Of telephones, only 1,824 instruments are in use, or only 0.7 per 1,000 of the population.

International Telephony.—SWEDISH-ITALIAN CONNECTION.—The Swedish State Telephone and Telegraph Department has added a new link to its net of international connections by opening telephone communication with Italy, one of the longest telephone lines in Europe, about 3,000 kilometres (about 1,865 miles) in length. The Swedes can now telephone to all countries in Europe, except the Soviet Republic and the Balkan States, besides the United States, Canada, Cuba, Mexico, Buenos Aires, and Ceuta, Morocco. Sweden now has 490,000 telephones, or 80 per 1,000 persons, while the metallic telephone lines have a total length of 860,000 kilometres (about 534,493 miles). Even little villages in the most remote districts have telephones. Stockholm, with 297 telephones per 1,000 inhabitants, is surpassed only by one city in the world, *viz.*, San Francisco.

Jugo-Slavia.—TELEPHONE SYSTEM.—It is reported that the Swedish American Match Trust, which recently obtained a match monopoly in Jugo-Slavia by making a loan to the Government of 30,000,000 dollars, has now offered an additional loan for an exclusive contract to rehabilitate the country's telephone and telegraph systems. If the offer is accepted, Jugo-Slavia will join the growing list of European countries that have entrusted their State telephone and telegraph services to private, or semi-private, bodies to be run on business lines, with a responsibility to the Government to provide an efficient and ample service.

Northern Ireland.—TELEPHONE CABLE.—Ballyhornan Bay, midway between Ardglass and Strangford, Co. Down, was the scene of activity on June 11th, when the cableship *Faraday* commenced to unload the last of the 60 miles of cable which is to be used for telephone communication between England and Northern Ireland. The new line will be connected with England *via* the Isle of Man, the other section having already been laid by the *Faraday* between Norbeck, near Blackpool and Greenaugh, I.O.M.

On June 13th the second of the two new cables which are being laid to connect Northern Ireland with England *via* the Isle of Man was put on shore at Ballyhornan, on the South Down coast.

AUTOMATIC TELEPHONY.—A new rural telephone exchange has been opened for service at Aughnacloy in the Clogher Valley, County Armagh. It is the first automatic exchange to be completed in Northern Ireland.

United States.—RADIO COMMUNICATION.—An extension of the operations of the Radio Corporation of America is forecast in an announcement by General J. G. Harbord, president of the Corporation, who has stated that plans have been made for the immediate establishment by the Corporation of a domestic wireless system to serve the United States through stations in 14 strategic cities, the number of which will be increased later. They will compete with leading telegraph companies; the recent grant of ten exclusive wireless channels, with five jointly shared channels, will be operated by the Radio Corporation's subsidiary concern, Radio Corporation American Communications, Inc., which is expected to act as a United States connection for the Radio Corporation's service to Europe, South America, and the Orient.

CENSUS OF TELEGRAPHS AND TELEPHONES.—According to data collected at the quinquennial census of electrical industries in 1928 by the Department of Commerce, the total number of messages transmitted in the United States by land and ocean telegraphy (excluding wireless) amounted to 229,511,278 in 1927, an increase of 20.1 per cent., as compared with 191,121,333 reported for 1922. The mileage of single wire in use in 1927 was 2,152,230, exceeding by 16.1 per cent. the mileage reported for 1922, which was 1,853,250. The increase in mileage of ocean cable was 36.3 per cent., from 76,711 nautical miles in 1922 to 104,541 nautical miles in 1927. The total number of telephones in use at the end of 1927 was 18,522,767, an increase of 29.1 per cent., as compared with 14,347,395 reported for 1922. The total number of calls made in 1927 was 31,614,172,621, representing an increase of 28.3 per cent. over the 24,647,560,860 made in 1922. The wire mileage, aggregating 63,836,182 in 1927, exceeded by 71.3 per cent. the corresponding mileage of 37,265,958 reported for 1922.

Radio Notes.

Australia.—PLANT CONTRACT.—The Commonwealth Government has accepted the tender of Standard Telephones and Cables, Ltd., for supplying and installing British-made plant at two subsidiary stations under the new national broadcasting scheme, capable of covering almost the whole of Australia. The decision is surprising because Amalgamated Wireless, Ltd., in which the Federal Government holds a controlling interest, which is associated with the Marconi interests, submitted a tender. Before making a final decision the Government took legal advice as to its obligations under the wireless agreement. It is proposed shortly to place a contract for two more stations.

Holland.—NEW COMPANY?—A new Dutch programme company, the H.I.R.O., which seeks to propagate the "humanitarian and idealistic," has been formed. The members of its committee have applied to all the existing radio companies for a proportion of their transmitting time, and, should their request be refused, hope to erect their own station.

WIRELESS CONFERENCE.—The Dutch Government has invited the United States to send representatives to a meeting of the International Technical Consulting Committee on wireless communication to be held at The Hague on September 19th. The State Department, U.S.A., has announced that if Congress approves of the expenses of participation, Government experts will be sent.—*Reuter's* (Washington).

SHORT-WAVE STATION.—Messrs. Philips Lamps, Ltd., inform us that recently tests have been made at Huizen (Holland) with a new short-wave transmitting station (PHI) working on a wave-length of 16.88 m. which is intended for working with the Dutch Indies, the service being under the control of the "Philips Omroep Holland Indie," abbreviated to "Phohi." The transmitter, by reason of its maximum anode output of sixty kilowatts, is claimed to be the world's most powerful short-wave station, and it is the second broadcasting station to be erected by Messrs. Philips, the first being their well-known station PCJ.

United States.—RADIO CENSUS.—Characterising the action of the House in opposing the Dill measure calling for a census of radio sets as a "flagrant disregard for the industry's most vital need," Mr. Edgar H. Felix, radio consultant to the National Electrical Manufacturers' Association, urges the passage of the amendment. "Radio legislation has imposed senseless restrictions on broadcast allocation and, in turn, obstructed progress in the development of the art," said Mr. Felix. "Although Congress demonstrated its lack of knowledge of broadcasting problems in passing the law calling for the 'equalisation' of station facilities in broadcast zones, a law which has been anything but helpful, it is now opposed to a measure that would give the industry an accurate picture of the number of sets in use and the extent of the radio audience. Not only would that information solve many of the major problems of the manufacturing and distribution branches of the radio industry, but it would also establish a sound economic foundation for broadcasting station charges, thus making possible a much higher standard of programmes and curbing the tendency toward direct advertising. The latter trend, which is becoming increasingly dangerous to the welfare of broadcasting, has its origin in the fact that advertisers are insisting on more and more direct propaganda in their radio programmes, failing to appreciate the enormous audience reached and its instinctive distaste of advertisement."

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—July 15th. State Electricity Commission of Victoria. Two 750-kVA transformers and spares. (B.X. 5325.)*

July 23rd. Posts and Telegraphs Department. Telegraph instruments. (B.X. 5323.)*

July 24th. Victorian Railway Commissioners. Electric overhead travelling cranes, spare motors, and trolley wires. (A.X. 8092.)*

SYDNEY.—August 12th. Department of Public Works. Auxiliary hydro-electric generating plant for Burrinjuck. (B.X. 5365.)*

Belgium.—IXELLES, BRUSSELS. July 5th. Supply of 887, 220 and 444 d.c. ampere-hour and watt-hour meters. Particulars for 6¾ fr. from Service de l'Electricité, 22, Rue d'Alsace-Lorraine, Ixelles.

Carlisle.—July 12th. Electricity Department. Supply, delivery, and erection of switchgear for use in an 11,000-V, 3-phase, 50-cycle sub-station. (See this issue.)

Chile.—VALPARAISO.—July 1st. Port Administration. Sixteen electric travelling cranes. (A. 8122.)*

Croydon.—July 4th. Electricity Department. Supply of 25,000 tons of coal suitable for use in chain grate mechanical stokers. (See this issue.)

Dundee.—July 10th. Electricity Department. One seven-panel e.h.p. compound-filled sub-station switchboard for a 6,600-V, 3-phase, 50-cycle system. (See this issue.)

Egypt.—CAIRO.—July 15th. Ministry of Interior. One 250-kVA Diesel engine-driven a.c. generating set, with switch and control gear. (B.X. 5331.)*

August 13th. Supply of an electric power station, with underground and overhead network, for the town of Maghagha. (B.X. 5318.)*

July 13th. Egyptian State Railways. Supply of underground unarmoured, lead-covered, paper-core telephone cable, approximately £E25,000 to £E26,000.—*Reuter's Trade Service* (Cairo).

Glasgow.—July 4th. Electricity Department. Extension of the overhead charging feeder system, and charging plant at the Govan refuse destructor station garage. Specifications, &c., from the general manager, 75, Waterloo Street, Glasgow, C.2.

Holywood.—July 2nd. Urban District Council. Laying and erection of l.p. underground and overhead mains and h.p. cable, erection of l.p. switchboard, h.p. armour-clad and truck-type switchgear, and 3-phase transformers. (June 14th.)

India.—SIMLA.—July 8th. Indian Stores Department. 30-kW oil engine-driven generating set for the Military Engineering Services, St. Thomas Mount, Madras. (B.X. 5364.)*

July 12th. Three continuous wave wireless transmitting sets, 580 to 3,000 meters. (See this issue.)

London.—CENTRAL ELECTRICITY BOARD.—July 22nd. Supply, delivery and erection of central indicators and telephones for the Central Scotland Electricity Scheme, 1927. (June 7th.)

July 27th. Supply, delivery, and erection of 132,000-V overhead transmission lines for the Mid-East England Electricity Scheme, 1929. (See this issue.)

LONDON COUNTY COUNCIL.—July 8th. 150 complete bodies for tramcars, 150 sets of swing bolster bogie trucks, 150 electrical equipments for tramcars, &c., and 150 magnetic track and wheel brake equipments. (June 7th.)

STEPNEY.—July 4th. Parish Guardians. Installation of two electric lifts, &c., at the South Grove Lodge, and one electric lift at the St. George-in-the-East Hospital. (See this issue.)

METROPOLITAN ASYLUMS BOARD.—July 10th. Supply and fixing of a complete wireless installation at Princess Mary's Hospital, Cliftonville, Margate. (See this issue.)

Newport (Mon.).—June 22nd. Electricity Department. One 1,250-kW motor convertor and switchgear. (June 7th.)

New Zealand.—WELLINGTON.—August 7th. Posts and Telegraph Department. Enamelled and silk-covered resistance wire. (B.X. 5322.)*

July 3rd. Black adhesive insulating tape. (B.X. 5378.)*

August 13th. Public Works Department. Water turbine-driven generating sets and switchgear for Waitaki. (B.X. 5278.)*

September 4th. Government Railways. Motor generator. (B.X. 5308.)*

AUCKLAND.—August 19th. Auckland Electric Power Board. Single-phase transformers. (B.X. 5324.)*

Nottingham.—June 28th. Electricity Department. Supply of general stores for the electricity undertaking for 12 months from July 1st, 1929. (June 7th.)

South Africa.—PRETORIA.—June 27th. Posts and Telegraphs Department. Automatic wall and table-pattern telephones. (B.X. 5273.)*

August 1st. Telephone cable. (B.X. 5345.)*

August 8th. Posts Telegraphs Department. Telegraph materials including iron tubular sidearms, porcelain insulators, paper sleeves, solder and insulating spindles. (A.X. 8112.)*

PIETERSBURG, TRANSVAAL.—August 13th. Municipal Council. Steam-raising plant, engine alternator and switchgear. (A.X. 7983.)* H. and l.p. cable, lamps and sundries. (B.X. 5312.)*

JOHANNESBURG.—June 27th. South African Railways and Harbours. 2,200- and 600-V cables and accessories. (B.X. 5343.)* Two 2-ton electrically-driven hoist blocks. (A.X. 8072.)*

August 1st. 10-ton electrically-driven overhead travelling crane for Maritzburg workshops. (A.X. 8105.)*

PORT ELIZABETH.—July 11th. Municipal Council. Electrical material, transformers, &c. (B.X. 5375.)*

Stafford.—July 2nd. Staffordshire Education Committee. Installation of electric lighting at Kingswinford Brockmoor Council school. (June 7th.)

Sunderland.—July 8th. Electricity Department. Paper-insulated, lead-sheathed cable, rubber-insulated wire, meters, gasfilled and vacuum lamps. (June 7th.)

Turkey.—CONSTANTINOPLE.—July 4th. Administration Générale des Chemins de fer et Ports d'Etat. Wires, cables and general lighting accessories. (B.X. 5368.)*

Uruguay.—PORT AUTHORITIES.—July 22nd. 300-kilo electro-pneumatic drop-hammer. (A.X. 7974.)*

Wolverhampton.—July 10th. West Midlands Joint Electricity Authority. Three 225,000-h.p. boilers with economisers, air heaters, fans, &c. (June 7th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Aberdeen.—Accepted :—
Electrical work in connection with the new MacRobert Hall at Robert Gordon's College.—Bell & Robertson, Ltd.

Bradford.—Electricity Committee. Accepted :—
Circulating-water pipes for turbines at Valley Road power station.—Stanton Ironworks Co., Ltd.
Steam piping for Valley Road power station.—Stewarts and Lloyds, Ltd.
Housing Committee. Accepted :—
Electric light installations at Council houses :—
180 houses, Class A (£625).—Armitage & Longbottom.
36 houses, Class A2 (£108).—Taylor & Ashworth.
24 single-room dwellings (£49).—H. Taylor & Co., Ltd.

Bradford-on-Avon.—Accepted :—
Installing electric light at the parish church (£220).—W. H. Rossiter & Co.

Bury.—Town Council. Accepted :—
Sub-station kiosk for electricity department.—Metropolitan-Vickers Electrical Co., Ltd.
Circulating-water screen for Chamber Hall power station.—F. W. Brackett & Co., Ltd.

Burton-on-Trent.—Watch Committee. Accepted :—
Electric traffic signals at Station Street (£105).—Forest City Electrical Co.
Electricity Committee. Accepted :—
Portable silt and sludge pump (£107).—Drysdale & Co., Ltd.

Cheadle and Gatley.—Urban District Council. Accepted :—
Electric lamps.—Edison Swan Electric Co., Ltd.

Dewsbury.—Town Council. Acepted :—
Cables (£1,028).—Greenwich Cable Co., Ltd.

East Ham.—Electricity Committee. Accepted :—
Two 1,000-kW convertors at Church Road sub-station (£5,499).—English Electric Co., Ltd. (revised tender).
Pilot cable (£256 9s. 6d. per 1,000 yards).—Enfield Cable Works, Ltd.
Crane for Manor Park sub-station (£131).—Herbert Morris, Ltd.

Glasgow.—Tramways Committee. Recommended :—
Armature coils.—P. R. Jackson & Co., Ltd.
Points and crossings.—Edgar Allen & Co., Ltd.

London.—ST. PANCRAS.—Contracts and Stores Committee. Recommended :—
One 1,000-kW motor convertor (£2,740).—Metropolitan-Vickers Electrical Co., Ltd.
Additions and alterations to pump house (£2,682).—Victoria Construction Co., Ltd.
Condensing water circulation pump (1,500,000 gallons per hour) (£2,050).—W. H. Allen, Sons & Co., Ltd.
Alterations and additions to engine room at King's Road (£1,371).—Industrial Constructions, Ltd.
L.p. cable (£4,359).—Hackbridge Cable Co., Ltd.
Tenders for wiring work under the small dwellings scheme :—
At Drummond Crescent (£245).—City Electrical Co.
At Thanet, Rasleigh, Sinclair, and Sandwich Houses (£652).—F. & E. Pickering.
At Hastings House (£228).—E. S. Russell & Co.
Electric kettles (3 pint) (19s. 10d. each).—General Electric Co., Ltd.
Electric irons (8s. 3d. each).—Revo Electric Co., Ltd.
GENERAL POST OFFICE.—Accepted :—
Cells.—Edison Swan Electric Co., Ltd.

South Africa.—CAPE TOWN.—Electricity Committee. Recommended :—
Cable for Muizenberg pavilion (£335).—Peel Electrical and Engineering Co., Ltd.
Brackets, fittings, and globes (£1,103).—S.A. General Electric Co., Ltd.
Slate panels, circuit breakers, and knife switches (£166).—Switchgear & Cowans, Ltd.

Stafford.—Staffordshire Education Committee. Accepted :—
Installation of electric light and power at Bilston new high school for girls (£1,033); and at Stafford girls' high school (£539).—W. G. France.

Forthcoming Events.

Institution of Mechanical Engineers.—June 25th-28th. Summer meeting.

Electrical Contractors' Association.—June 26th to 28th. Bournemouth. Annual Conference.

Royal Society of Arts.—Wednesday, June 26th. Annual general meeting.

Physical Society.—Friday, June 28th. Imperial College of Science, South Kensington, S.W. 5 p.m. Ordinary meeting.

Institution of Electrical Engineers (South Midland Centre). July 2nd. Summer meeting. Visit to the Avonmouth Docks.

North-East Coast Institution of Engineers and Shipbuilders. July 2nd-4th. Summer meeting. Newcastle-on-Tyne.

Tramways and Light Railways Association.—July 3rd-5th. Sheffield. Annual Congress.

Overhead Lines Association.—Friday, July 5th. Summer meeting. Charabanc tour in the Mid-Cheshire area.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names of suppliers of the following :—

POLLOPAS moulding powder.
Electric hedge clipper.
Importers of K.D.A. cables.
Makers of CELLINOID lanterns.
Makers of BOMB type fuses.
"ACORN" electric water heaters (geysers).

Notes.

Extensible Conductors for Mines.

In a recent issue of "*E.T.Z.*" Herr. H. W. Birnbaum gives some particulars of the extensible electric cables for use in mines which are being manufactured by the Duisburg Cable Works, of Duisburg, Germany. The special cables have all the qualities of ordinary cables and only differ from them by the use of special packing layers between the conductors. The method of construction is such that as the cables are stretched the conductors approach more closely to each other, the reverse action taking place when the tension on the cable is relaxed, no strain, however, being imposed on the conductors themselves. Tests with the extensible cable show that without interfering in any way with their electrical conducting qualities they may be stretched to the extent of 4 per cent. of their length.

Electricity Supply in North Ireland.

At the recent annual Conference at Ballymena of the General Council of Municipal Authorities of Northern Ireland, Mr. Boyd, according to the *Irish Independent*, read a paper on "Electricity in Northern Ireland." Mr. Boyd said that nothing had been done in Northern Ireland in regard to the co-ordination of an electricity supply. He urged that the recommendation of the Commission set up by the Northern Government in 1923, that expert advice should be obtained as soon as possible on the problems involved in the development of electrical supply in Northern Ireland, should be acted on immediately. There was no doubt that the Northern Government had side-tracked electricity supply. The units consumed per head of the population of the Free State were about 25 to 30, and about half that in Northern Ireland. The average density of population in the Free State was about 90 to 100 persons per square mile, against about 200 in Northern Ireland. That was to say, that on a basis of 30 units per head of the population about 300 units per square mile would be got in the Free State, against, on a basis of 50 units per head, 1,000 per square mile in Northern Ireland. To give an idea of the capital involved in a Northern Ireland scheme for generation, compared with that in the Free State, the cost of the water-power station at Limerick would be £40 to £50 per kilowatt installed, and the cost of extending the Belfast Harbour Station, sufficient as a primary station for generation for many years, would be from £8 to £13 per kW. It had been estimated that the extra capital charges on the water scheme would wipe out any saving due to the absence of any fuel costs, and other incidental costs in running steam plant. It was not generally realised that a modern steam station, at the load factors obtaining to-day, could easily beat the average water-power station in cost per unit delivered.

The Electrical Association for Women.

Reference was made in our issue of June 14th to a meeting which was held in Plymouth in connection with the formation of a local branch of the Electrical Association for Women. Councillor Mrs. Daymond presided and introduced Miss Haslett, director, who addressed the meeting. Miss Haslett explained that the Association worked with a two-fold aim, to educate the housewife in the best modern uses of electricity by means of lectures and visits to places of electrical interest, and to give means for the expression of women's point of view in the electrical industry. Although the Association was formed only four years ago, several good pieces of work had been already accomplished. These included the National Woman's Specification, arising from the Outlet Campaign, and the securing of a promise from the Board of Education to consider the universal teaching of electricity in conjunction with domestic science in schools. A committee has been formed to develop the proposed E.A.W. in Plymouth, and has been fortunate in securing the support of Lady Astor as president. It is hoped that the inauguration will take place in October.

Battersea Power Station.

The Public Health Committee of the L.C.C. has received communications from the Chelsea Borough Council and the Westminster City Council raising the question of nuisance and injury to public health and property likely to be caused by the emission of sulphur fumes from the chimneys of the new power station to be erected at Battersea, and has recommended that, on the understanding that the Council is in no way committed as to policy in the matter, the invitation of the Westminster Council to appoint representatives to a proposed conference of local authorities concerned on steps necessary to safeguard the health of the community and property in the neighbourhood of the proposed station be accepted.

Prevention of Fumes, &c., from Power Station Chimneys.

The Electricity and Public Lighting Committee of the St. Pancras Borough Council has received a report from the electrical engineer, suggesting a method for effectively dealing with the dust and grit which at times emanates from the King's Road power station, in which he states that he has designed and installed a system of water-spraying apparatus in the chimney of two boilers which produces a fine mist, and by saturation and gravity substantially assist, in preventing the finer kinds of dust, which escape the arrestors, from being expelled from the chimney. To test the efficiency of the water-spraying methods, the chief chemist of one of the principal electrical power companies has made special analytical tests of the water effluent after treating the gases for dust which has been retained in the chimney, and the efficiency of this method in absorbing the sulphurous and sulphuric acids is very definitely confirmed by the results of the analysis. The method has also been tested by the chemist of Messrs. Babcock & Wilcox, Ltd., and its efficacy confirmed. It has been found that the design of the outlets to the boiler chimneys does not allow sufficient expansion for the gases to reduce their velocity and so permit of the particles of dust being deposited before entering the chimney. To rectify this and restrict the emission of dust into the chimneys, he has devised a scheme whereby large chambers can be inserted between the outlets of the boilers and their respective chimneys, which will permit of the speed of the travelling gases being reduced from 27 ft. per sec. to 7 ft. per sec., and if necessary, treated with water sprays. The chambers will be composed of mild-steel plates coated with sheet-lead inside to restrict the destructive action of sulphurous acid. The dust or sludge collected would then, by mechanical means, be carried away to suitable tanks for disposal. The Committee has recommended that, subject to the consent of the Electricity Commissioners, the electrical engineer be authorised to apply the method outlined in his report to two of the pulverised-fuel boilers at an estimated cost of £3,250, and that Messrs. Babcock & Wilcox, Ltd., be instructed to carry out the work.

An Institution Installation.

An interesting installation has recently been completed at the London Road Institution for the supply of electricity for lighting, &c., using the exhaust for the heating and hot-water services. The generating plant consists of a 90-kW, 60-kW and 40-kW "Belliss-Crompton" sets, a 70-kW set by Alley and McLellan, and also a 15-kW "Blackstone" oil engine and dynamo. The present cost of electricity generated at London Road Institution, including interest and sinking fund on all outstanding loans on the station equipment, is 1.7d. per unit, as against the best offer of the supply undertaking in 1926 of 2.54d. per unit.

During both winter and summer, day and night, the whole of the exhaust steam from the engines and pumps is absorbed in supplying heat and hot water to the Institution. This is accomplished by installing thermal-storage units of suitable capacity on the hot-water service systems, to conserve the heat from the engines when the peak load on the electricity demand does not synchronise with the maximum demand for heat in the Institution. There are three Lancashire boilers, 30-ft. long and 8-ft. 3-in. diameter, made by Messrs. H. & T. Danks, and built for 160 lb. working pressure. Two boilers are fitted with furnaces by Messrs. J. & J. Neil, equipped with rocking bars, and there is a bridge at the back designed for the purpose of preventing smoke. The other boiler is fitted with a Crosthwaite forced-draught furnace. A Goodbrand Economiser fitted at the back of the boilers is capable of raising the feed water to 280 deg. F. on its way to the boilers. All the steam used in every department, including the engines, calorifiers, pumps, laundry, kitchen, operating theatre and disinfector, is measured by Kent's steam meters. In actual practice the total of these steam meters balances very closely with the feed water to the boilers. It will be interesting to note the live steam used in the various departments per week in summer and winter, respectively: kitchen, 113,000 lb. and 131,000 lb.; heating and hot-water service, 423,000 lb. and 850,000 lb.; laundry, 110,000 lb. and 122,000 lb.; disinfector and operating theatre, &c., 55,000 lb. and 126,500 lb.; engines, 244,000 lb. and 411,000 lb.; turbines, 101,000 lb. and 232,000 lb.

The exhaust steam from the engines and turbines is, of course, used in the calorifier house, in addition to the live steam given above.

There are two hot-water storage cylinders, each of 4,000 gallons capacity, made by Wright's Forge & Engineering Co. In each cylinder are two batteries of copper tubes. The lower one is supplied with exhaust steam from the engines and pumps, and is the only battery in use except at time of heavy draw off. An automatic temperature regulator made by the British Arca Regulator Co. admits steam to the upper or live-steam battery, and continues to do so until the temperature of the water in the cylinder reaches normal, when the live steam is automatically cut off. The hot water is pumped round the whole Institution to every draw-off point by means of Mather and Platt's centrifugal pumps driven by turbines made by Hayward's Engineering Co. There are also stand-by turbines and pumps. A somewhat unusual feature in connection with the hot-water service is that some of the draw-off taps and baths are at a higher level than the service tank.

Three heating calorifiers are responsible for the heat required in all buildings. These are also fitted with exhaust steam and live-steam batteries, the exhaust being in the back end of the cylinder, and the live steam in the front end. All the water condensed in the calorifiers has to pass through steam traps. The clean exhaust goes into a hot well in the pit adjoining the Weir pump, and is then pumped automatically by means of a controlled pump made by Messrs. G. & J. Weir into an overhead tank at the left end of the calorifier house, which tank forms the boiler feed reserve. The more or less greasy exhaust

from the engines is not considered sufficiently safe for boiler feed, so it is pumped up into the tank over the boiler house yard, and is used in the hot-water service. About 80 per cent. of the steam generated in the boilers is condensed and used again in this way. The remainder goes into the laundry washing machinery, to the operating theatre and to the disinfector and elsewhere.

In the laundry there are four belt-driven 84-in. by 42-in. Braithwaite washing machines and three underdriven electric hydro-extractors, made by Messrs. Broadbents. The output of the laundry is 30,000 articles per week, and the cost of washing, including steam, water, soap, consumable materials, labour, &c., is 6s. 3d. per 100 articles.

The hospital, which has on the average 529 occupied beds, is equipped with an X-ray plant, ultra-violet-ray lamps and various electro-medical appliances.

Appointments Vacant.

Civilian education officer at the R.A.F. electrical and wireless school. Two draughtsmen required by the Royal Aircraft Establishment, South Farnborough, Hants. Lady demonstrator for Worksop Urban District Council. Assistant engineer for Basingstoke Corporation. Meter mechanician for Middleton Corporation. Electrical engineer for Tobermory Town Council. (See our advertisement pages to-day.)

Marine Lighthouse Administration.

The Corporation of Trinity House is to hold an informal International Conference at Caxton Hall, Westminster, next month to discuss technical matters relating to lighthouse illuminating apparatus, fog signals, wireless-beacon fog signals, and other cognate subjects concerning lighthouse administration. Representatives of the lighthouse services of some 20 foreign countries will be present, and, in addition to representatives of the principal lighthouse authorities in this country delegates are expected from Canada, India, New Zealand, and South Africa. The Conference will be opened on Monday, July 8th, by the Duke of Connaught, Master of Trinity House.

Fatalities.

An inquest was held at Bootle on June 11th on Owen Jones (28), a tester employed by the Liverpool Electric Cable Co., who received a fatal electric shock at 10,000 V through coming into contact with an electric cable. It was stated a cable weighing 9 tons was being tested with a pressure of 10,000 V in the testing department, and warning lights were illuminated outside the building. Jones must have entered the building before his time for testing the contact. A verdict of "Death by misadventure" was returned.

An inquest was held on June 12th at Newport (Mon.) on Charles Barnes (19), who received a fatal electric shock whilst employed at the works of the British Mannesmann Tube Co. William John Fisher, an electric crane driver, said that after ineffective operation of the hoist motion he brought his crane to a standstill. Barnes, after directing that the cab switch should be switched off, tested the cross-travel wires and entered the cab where he received a shock. Mr. H. G. Townsend, chief electrical engineer at the works, expressed the opinion that Barnes had slipped on a resistance box and had accidentally knocked in the switch. A verdict of "accidental death" was returned.

Educational.

MANCHESTER UNIVERSITY.—The Municipal College of Technology offers a limited number of research scholarships, of a value not exceeding £100, tenable during the 1929-30 session for research undertaken in the Departments of Electrical Engineering and Electrochemistry, amongst others. Applications must be lodged not later than July 6th, 1929.

British Empire Scholarships at Loughborough.

The entrance examinations for the award of British Empire Scholarships in the Faculty of Engineering, Loughborough College, have now been completed and awards made. The scholarships are tenable at Loughborough for the full period of the diploma course, and the Governors of the College have approved the following awards for 1929:—L. M. G. F. Cabral, Queen's College, Georgetown, British Guiana; S. W. Millward, Grammar School, Cheltenham; F. G. McDonald, Technical High School, Johannesburg; T. D. Walshaw, Hurstpierpoint College, Sussex; P. Finucane, Lawrence Royal Military School, Sanawar, India; and H. I. Price, County School, Abertillery. These scholarships are open to all British subjects resident in any part of the Empire, and are of the value of £75 per annum. Applications were received from a large number of the public and secondary schools in England, South Africa, Rhodesia, Australia, British Guiana, India, and the Federated Malay States.

I.M.E.A. Convention Golf Competition.

In the golf competition held during the Incorporated Municipal Electrical Association Convention at Torquay, the "Dennis" trophy in aid of the Institution of Electrical Engineers' Benevolent Fund was won by Mr. Crinks, of Metropolitan-Vick Supplies, with a net score of 76, the runner up being Mrs. D. Antliff, with a score of 77.

The Institution of Production Engineers.

The Institution, one of the younger scientific institutions which devotes itself mainly to the study of practical problems in modern engineering production, has acquired new headquarters in London at 48, Rupert Street, W.1, within two minutes' walk of the Engineers' Club. Mr. Richard Hazleton has been appointed general secretary.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

The Bridport Town Council has appointed Mr. H. F. CASTLE electrical engineer and manager as from August 1st. Mr. Castle is chief assistant engineer at Basingstoke and was formerly with the Leatherhead and District Electricity Co., Ltd.

The employés of the Sheffield Corporation Electric Supply Department have presented to Mr. S. E. FEDDEN, the retiring general manager and engineer, an antique table and sportsman's field glasses. The presentation was made by Mr. A. Doxey, the oldest employé. As a parting gift Mr. Fedden presented the Department's sports and social club with a pair of solid silver cups for competition in the tennis section.

Mr. F. G. ARNOTT, who for the past five years has represented Messrs. J. H. Tucker & Co., Ltd., in London, has joined Simplex Conduits, Ltd. (London office) as a sales representative.

Mr. E. T. PRICE, of Cardigan, has been appointed electrical engineer to the Newcastle Emlyn and District Electric Supply Co., Ltd.

Mr. W. M. BROWN has been appointed general manager by the Gramophone Co. Mr. Brown was responsible for taking over and working the Marconiphone business.

Mr. A. H. DARKER, A.M.I.E.E., A.M.I.Mech.E., chief electrical engineer of Messrs. J. Stone & Co., Ltd., who has been on a world tour, has now returned to London.

The marriage took place at Holy Trinity Church, Blackburn, on June 4th, of Mr. DONALD P. SAYERS, B.Sc., A.M.I.E.E., of Cheam, Surrey, and Miss HILDA LOMAX, of Blackburn. Mr Sayers, who was formerly connected with the Blackburn electricity undertaking, is now on the staff of a London firm of consulting engineers.

Mr. W. H. PEAK, O.B.E., has resigned his appointments as managing director of the Marconiphone Co., Ltd., the Sterling Telephone and Electric Co., Ltd., and the Relay Automatic Telephone Co., Ltd. Private communications should be addressed to 17, Holland Park, W.11.

Mr. T. J. FRANCIS, B.Sc., A.M.I.E.E., who has been engaged at the Bolton Corporation Electricity Works for the past four and a-half years and for six years has been part-time lecturer at the Bolton Technical College and the Manchester High School of Commerce, has been appointed lecturer in mechanical and electrical engineering at the Plymouth and Devonport Technical College.

It was announced last week end that Mr. HOWARD C. LEVIS had resigned from the boards of the British Thomson-Houston Co., Ltd., and the Associated Electrical Industries, Ltd., of both of which he was chairman. It is stated in some of the Press reports that it was Mr. Levis's intention to retire from active business last year, but he decided upon the acquisition by the Associated Company of the ordinary shares of the B.T.H. Co. to become chairman of the Associated Company to assist. This statement was followed on Monday last by an announcement that Sir Felix Pole, general manager of the Great Western Railway Co., had accepted the post of chairman of Associated Electrical Industries in place of Mr. Levis. Sir Felix Pole, whose photograph we present accompanying these notes, is 52 years of age. At the age of 14 years he became a clerk in the telegraph department of the G.W.R. at Swindon. It is his intention to remain with the company, though not

in a managerial capacity. From his entry into the service of the company he advanced from department to department, including the electrical department, until in 1919 he became assistant to the general manager, and was further

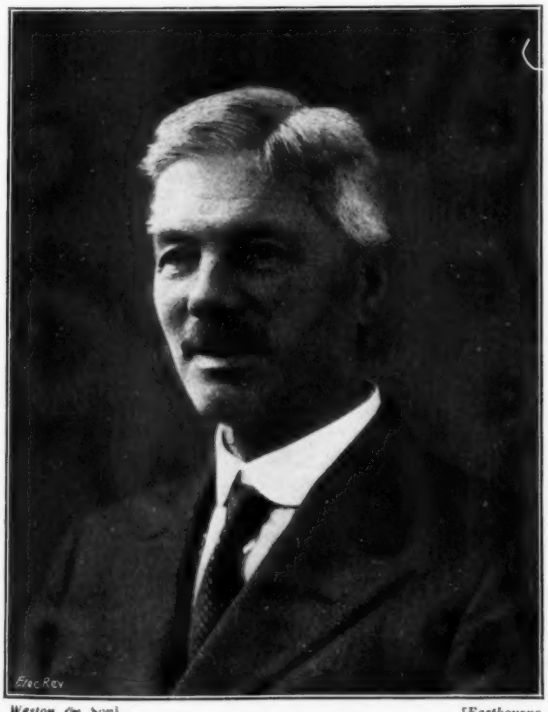
Elliott & Fry [*London.*

Sir Felix Pole.

Chairman of Associated Electrical Industries, Ltd.

promoted two years later to be manager. The railway company will still have a call on his services in a consultative capacity.

Mr. JOHN KEMPE BRYDGES, M.I.E.E., as stated elsewhere in this issue, was on the 7th instant elected president for the



J. Wesson & Son] [*Eastbourne.*

Mr. J. K. Brydges,

President of the I.M.E.A., 1929-30.

coming session of the Incorporated Municipal Electrical Association. Mr. Brydges has held the position of electrical engineer to the county borough of Eastbourne ever since the borough started to supply electricity. Like his predecessor in the office of president (Mr. A. Nichols Moore), Mr. Brydges is a Cheltonian, having been born in Cheltenham in 1867. He was educated at Cheltenham College and received his technical training at King's College, London, and the City and Guilds Central Technical College, South Kensington. His workshop experience was gained with the General Electric Co. of America, by whom he was also engaged in the erection of plants at Andover and Weymouth, Mass., and at Augusta, Ga., and afterwards as manager. After some six years spent in this manner, Mr. Brydges returned to England and joined the staff of the late Robert Hammond. In 1896 he became electrical engineer to the City of Wakefield. In 1899 Eastbourne Corporation took out a Provisional Order for its area (subsequently extended) and appointed Mr. Brydges electrical engineer. Early in the following year the Corporation acquired the undertaking of the Eastbourne Electric Light Co. Mr. Brydges became Associate of the Institution of Electrical Engineers in 1890, Associate Member in 1899, and Member in 1902.

As we reported in our last issue, the appointment of Mr. E. MORGAN as chief engineer and general manager of the Sheffield Electricity Department, has been confirmed. Mr. Morgan is 43 years of age. He was educated at Liverpool University, and received his early training with the British Westinghouse Co. After serving with the Yorkshire Electric Power Co., he went to Wolverhampton in 1920 as technical engineering assistant, becoming chief assistant in 1925. In the following

Lafayette.] [*Manchester.*

Mr. E. Morgan,

The New City Electrical Engineer, Sheffield.

year Mr. S. T. Allen, the borough electrical engineer, was appointed engineer to the West Midlands Joint Electricity Authority, and Mr. Morgan took his place. During his occupancy of the post, Mr. Morgan has been responsible for a great deal of rural development and for the changing-over of the system from d.c. to a.c. He has represented Wolverhampton on the area Joint Board and District Council for the Supply Industry, the West Midlands J.E.A., and the Incorporated Municipal Electrical Association. He is a member of the Institution of Electrical Engineers and an associate member of the Institutions of Civil and Mechanical Engineers. A portrait of Mr. Morgan is reproduced herewith.

Mr. C. W. CHARLESWORTH, manager of the Marconi Works at Chelmsford, has accepted an appointment with the Gramophone Co., Ltd. He is a director of the Sterling Telephone and Electric Co., Ltd., and of the Marconiphone Co., Ltd.

Sir JOSIAH STAMP, G.B.E., D.Sc., has accepted the office of President of the Institute of Transport in succession to Air Vice-Marshal Sir Sefton Brancker, K.C.B., A.F.C., whose year of office expires on September 30th next.

Mr. ARTHUR CROTCH, who recently retired from the Post Office service, commenced his career as a telegraphist in 1883. In 1900 he came to London, being placed on the staff of the engineer-in-chief. He is the author of a number of works on telegraphy and telephony.

Obituary.—MR. R. W. PENNINGTON.—The death has taken place, after an operation, of Mr. Robert Wilson Pennington, director of Gilbert Gilkes, Ltd., turbine makers, Kendal. He was 55 years of age, and had been associated with the firm for many years.

Mr. C. F. BRUSH.—The death occurred recently at Cleveland, Chio, of Mr. Charles Francis Brush, whose name is famous as that of a pioneer investigator of electric lighting. He was born in March, 1849, so was 80 years of age. Mr. Brush was experimenting with magnets and batteries when he was 13 years old. He graduated at Cleveland High School and studied later at the University of Michigan, graduating as a mining engineer in 1869. He carried on other occupations for a time and during this period resumed his electrical studies which led to the completion of his first dynamo in 1876. He then directed his attention wholly to electrical matters, made a contract with a company for the production and sale of his patented apparatus, and in 1881 that company was renamed the Brush Electric Co. It was in 1877 that he invented his first commercial arc lamp which carried all honours at the Franklin Institute. Other work included inventions connected with storage batteries; these led to many years' litigation which ended successfully for Brush. In 1880 he sold a number of patents to the Anglo-American Brush Electric Light Corporation in London. He received what was then regarded as a very high price for his patents. He must have been the pioneer in the use of windmills for electircal installations. The full story of Mr. Brush's life is too long to tell here. He began as a self-taught mechanic; later in life was known as the father of the electric lighting industry; and subsequently was accorded honours by the University of Michigan and the Western Reserve University, was decorated a Chevalier of the Legion of Honour by the French Government, and elected a Fellow of the American Association for the Advancement of Science—these and many more things combined to make up the fine record of one who so long ago was constantly before us as a pioneer but has latterly not been quite so prominently engaged before the public view. From him we of the electrical industry derive the household name of "Brush."

MR. A. MEISTER.—We regret to record that Mr. A. Meister, vice-president and treasurer of the Garfield Manufacturing Co. in New York—a company of moulding products for the electrical tarde—was among those lost in the Channel air disaster of Monday last. Mr. Meister was born in Switzerland, and he emigrated to the U.S.A. fifty years ago. He was on a pleasure trip to Europe, and up to the end of last week was searching out old friends in the electrical industry here. He left in the Imperial air liner *City of Ottawa* on Monday morning, and was one of the seven passengers drowned in the disaster.

MR. W. W. SMITH.—Mr. William Wild Smith, A.M.I.E.E., late P.O. engineer at St. Albans, died suddenly at 21, Lancaster Road, N.W.3, on June 10th.

MR. F. MAKEPEACE.—Mr. Francis Makepeace, chief engineer to the S.W. District, G.P.O., died at the age of 60 years on June 11th.

DR. T. BLACKWOOD-MURRAY.—The death occurred on June 11th, in Switzerland, of Mr. Thomas Blackwood-Murray, D.Sc., M.I.E.E., late chairman and managing director of the Albion Motor Car Co., Ltd., at the age of 58 years.

Wills.—Major-General R. H. MAHON, C.B., who was deputy-chairman of the Calcutta Electric Supply Corporation, left £19,796 net, and £20,755 gross, personalty.

Dame MARY FANNY ALEXANDER LODGE, wife of Sir Oliver Lodge, left £3,816 gross and £3,777 net.

Mr. C. A. MEYJES, formerly editor of the *Ironmonger*, left £23,780 gross personalty, and £21,069 net personalty.

Mr. A. C. DORMAN, a director of Dorman, Long and Co., who died in February at the age of 54 years, and was the eldest son of Sir Arthur Dorman, left £60,680 gross and £55,514 net personality.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Fenchurch Radio, Ltd.—Private company. Registered June 10th. Capital, £500 in £1 shares. Objects:—To carry on the business of makers of, and dealers in wireless apparatus, components and accessories, electric lighting and heating fittings, &c. The subscribers (each with one share) are:—G. Lane, 15, Gordon Street, Gordon Square, W.C.1, wireless dealer; D. F. Cubitt, 5, Windmill Road, Wandsworth Common, S.W.18, cashier. The first directors are to be appointed by the subscribers.

Coalisland and District Electric Supply Co., Ltd.—Private company. Registered June 5th in Dublin. Capital, £2,000 in £1 shares. Objects:—To carry on at Coalisland, Co. Tyrone, and elsewhere the business of an electric light and power company, &c. The directors are:—J. K. Stewart, millowner; Annie McKeown, bookkeeper; Mrs. Ida L. Stewart, all of Coalisland. Secretary: Annie McKeown. Registered office: Coalisland, Co. Tyrone.

Mersey Electrics, Ltd.—Private company. Registered June 11th. Capital, £3,000 in £1 shares. Objects:—To acquire the goodwill and all other assets of the business of electrical and mechanical engineers carried on by James Scott & Co., Knowsley Electrical Works, Brasenose Road, Bootle, to adopt an agreement with J. J. Scott, E. Dudley, and C. A. Braddock, and to carry on the said business and that of boiler makers, founders, shipbuilders, &c. The first directors are:—E. Dudley, 33, Moss Lane, Walton, Liverpool; C. A. Braddock, 41, Galloway Road, Waterloo, Liverpool; J. McGuire, 44, Cambridge Road, Bootle. Registered office: 64, Brasenose Road, Bootle, Lancs.

Radiograph, Ltd.—Private company. Registered June 14th. Capital, £100 in £1 shares. Objects: to carry on the business of wholesalers and retailers of wireless sets and parts, photographic materials, electrical and musical appliances, &c. The directors are: J. R. Jennens, 52, Holyhead Road, Handsworth, Birmingham; Nellie West, 10, Church Hill Road, Handsworth, Birmingham. Registered office: 2a, Station Road, Handsworth, Birmingham.

Official Returns of Electrical Companies.

British Radio Valve Service, Ltd.—S. Cole, Sardinia House, Kingsway, W.C.2, ceased to act as receiver or manager on May 28th, 1929.

Radio Service (London), Ltd.—Satisfaction to the extent of £125 (being balance), on May 15th, 1929, of debenture dated July 25th, 1927, securing £2,750.

North Metropolitan Power Station Co., Ltd.—Capital, £100 in £1 shares. Return dated March 12th, 1929. All shares taken up. £100 paid. Mortgages and charges, £850,000.

H. H. Ridley & Co., Ltd.—Capital, £2,000 in £1 shares. Return dated May 6th, 1928 (filed February 11th, 1929). 1,900 shares taken up. £102 paid. £1,798 considered as paid. Mortgages and charges, nil.

Palmers Green Radio Service, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1928 (filed February 14th, 1929). 2 shares taken up. £2 paid. Mortgages and charges, nil.

Cattley Accumulator Co., Ltd.—Capital, £5,000 in £1 shares. Return dated January 11th, 1929. 2,850 shares taken up. £1,900 paid. £950 considered as paid. Mortgages and charges, nil.

Fullers (Ilford), Ltd.—Capital, £52,500 in 45,000 10 per cent. preferred ordinary shares of £1 each and 150,000 deferred ordinary shares of 1s. each. Return dated December 31st, 1928 (filed May 3rd, 1929). 37 preferred ordinary shares taken up. £37 paid. Mortgages and charges, nil.

El-Be Utilities, Ltd.—Capital, £500 in £1 shares. Return dated October 5th, 1928 (filed March 14th, 1929). All shares taken up. £500 paid. Mortgages and charges, nil.

S. T., Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1928 (filed April 8th, 1929). 2 shares taken up. £2 paid. Mortgages and charges, nil.

Edison Swan Cables, Ltd.—Capital, £150,000 in 100,000 preference shares of £1 each and 200,000 ordinary shares of 5s. each. Return dated January 11th, 1929. 900 preference and 200,000 ordinary shares taken up. £50,900 paid. Mortgages and charges, £123,000.

Bel Canto Radio Reproducer Co., Ltd.—Capital, £600 in 500 preference and 100 ordinary shares of £1 each. Return dated January 14th, 1929. All shares taken up. £600 paid. Mortgages and charges, nil.

Wholesale Electrical Supplies (Salford), Ltd.—Capital, £1,000 in £1 shares. Return dated October 27th, 1928 (filed February 15th, 1929). 500 shares taken up. £500 paid. Mortgages and charges, nil.

Wortex Manufacturing Co., Ltd.—Satisfaction in full on June 5th, 1929, of mortgage debenture dated July 15th, 1927, securing £2,000.

Attaix, Ltd.—H. C. Merrett, 32, Finsbury Square, E.C.2, ceased to act as receiver or manager on June 3rd, 1929.

E. K. Cole, Ltd.—Satisfaction in full on February 15th, 1929, of mortgage dated May 8th, 1928, securing all moneys due or to become due, not exceeding £3,000. (Notice filed June 10th.)

Watford Electric & Manufacturing Co., Ltd.—Satisfaction to the extent of £500 on May 31st, 1929, of debenture dated May 31st, 1923, securing £3,000. (Previously satisfied £2,500.)

Mills English Engineering Co., Ltd.—W. R. Thomas, 59, Wind Street, Swansea, was appointed receiver and manager on June 6th, under powers contained in debenture dated January 8th, 1929.

Alpha Electric & Oxy-Acetylene Welding Co., Ltd. (Old company).—F. Reed, Westgate Chambers, Newport, Mon., ceased to act as receiver or manager on May 31st, 1929.

City Notes.

Siemens Bros. & Co., Ltd.

At an extraordinary meeting last week resolutions altering the company's articles of association were confirmed. In the course of his explanation the chairman, Lord Queenborough, G.B.E., said that the company had founded its early success on research and development. Research was more essential to-day than ever before and the company found it hard to keep pace with the large American and Continental concerns which had very much more money to spend in this direction. Moreover, in recent years, the tendency of some of their competitors no longer to confine themselves to methods of direct sale, but to obtain business by acquiring concessions or giving long-term credits on large schemes, necessitated their interesting themselves in that class of business, and that involved entering into very heavy financial obligations and the locking up of big sums of money for long periods. It was natural, therefore, that they should examine carefully the various possibilities of obtaining the advantages of the research and technical development undertaken by some of these powerful groups in concessions and any necessary long-term credit business rather than undertake the obligations in whole upon themselves in competition with those groups. They had been able to make satisfactory arrangements, without in any way affecting the British control of the company, with Siemens and Halske, of Berlin, the largest telephone manufacturers on the Continent and with a very powerful international group. The two groups had associated with them a large number of important companies which together practically covered most countries in the world. The agreement provided for a complete exchange of technical information and for cross-licensing under all telephone patents all over the world in which the parties were jointly interested, while leaving each party a free hand in the matter of prices quoted to customers. They had also arranged with Siemens & Halske for a complete exchange of research, development work, and factory experience in all other fields which were common to both companies. The value of this arrangement was considerable as Siemens and Halske spent more upon research and development work in a year than the whole of their company's profits. They had arranged to issue to Siemens & Halske 450,000 ordinary shares and would receive in exchange 6,557 700-mark shares in the German company. The directors were satisfied that this would be advantageous to the company. The arrangement would give 15 per cent. of the voting power to Siemens and Halske and would therefore not jeopardise the British control of the company. The articles of association provided that not more than 25 per cent. of the total voting power should be in foreign hands.

India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.

In their report on the first half of the current financial year the directors regret that although there is a small aggregate improvement on the corresponding period of last year, the actual results are still far from satisfactory. The output has been fairly well maintained, but only at reduced selling prices in several important sections. The resultant loss of profit can only be met by considerably increased sales and reduced expenses, and everything possible is being done in this direction. The position at the French works is decidedly better. The serious losses of recent years have been stopped, and the directors are confident that the factory will very soon contribute to the company's profits. A reorganisation of the steam and power plant at Silvertown is in progress, and this is expected to yield further substantial economies. There has been some improvement in the results of the Burton factory, and a small increase in the profits from the foreign branches.

The submarine cable department and the c.s. *Silvergray* have had little employment during recent months. The directors are unable to recommend the payment of a dividend on the ordinary shares, but the preference dividend due on July 1st will be paid on that date. The attention of the directors has been called to rumours appearing in the Press as to impending combines or amalgamations affecting the company; they state that there is no foundation for these reports.

Anglo-Argentine Tramways Co., Ltd.

The report for the year ended December 31st, 1928, shows that the gross receipts rose from £4,658,618 to £4,719,180, and the net revenue from £1,011,640 to £1,026,132. After adding interest received, &c., and providing for debenture service, &c., there remains £383,712, to which is added £61,216 brought forward, making £444,928. After meeting the dividends on the first and second preference shares, £85,928 is carried forward. The number of passengers carried increased from 560,747,554 to 570,079,027. Reference is again made in the report to the difficulties engendered by the congested state of central Buenos Aires. This has been mitigated, but the cause has not been removed. Although the company's omnibuses have run at a loss, they have proved a valuable auxiliary to the other services. The company's *ad referendum* agreement on the subject of tariffs has not yet been ratified by the Municipal Council. The need of underground line extensions renders this matter one of ever-increasing urgency, and it is hoped that it will be definitely dealt with by the Council at an early date. The death of Mr. C. H. Sanford and the retirement of Sir Frederick Sykes from the board are recorded, and it is stated that the vacancies have been filled by the appointment of Sir Edmund Wyldbore-Smith and Mr. G. C. Touche. Meeting: June 25th.

Rangoon Electric Tramway and Supply Co., Ltd.

The annual meeting of this company was held on June 11th. Mr. W. A. W. Dawn (chairman), who presided, said that considerable difficulty had been and was still being encountered in maintaining a regulated headway of the tramway services during the busiest traffic periods of the year, due to the replacement of sleeper construction by concrete construction demanded by the Corporation. Since 1920 the expenditure on track construction had been 27 lakhs, and now further expenditure on the concrete foundations was called for by the Corporation. The onus of road maintenance on electric tramways was admittedly an anomaly under present conditions, and in common with other tramway undertakings, the company found that conditions were becoming intolerable and that some relief should be afforded. The power plant had worked satisfactorily and the new boiler was nearing completion. The new pumping plant and 30-in. pipe line for the supply of condensing water was now available and would meet the demands for this purpose for some years ahead. In addition to extensions in Rangoon, the lighting of the streets in Kemayut and Thamaing was completed. Good progress had been made with the work of increasing the l.p. single-phase distribution voltage from 115 to 230 V, and the 3-phase supply from 200 to 400 V. The report and accounts were adopted and Mr. J. Watson and Khan Bahadur Haji A. Chandoo were elected to the board.

Madras Electricity Supply Corporation, Ltd.

The annual meeting was held on June 11th, Mr. J. G. B. Stone (chairman) presiding. In presenting the report and accounts (*vide* ELEC. REV., June 14th, p. 1066), the chairman said that the electrical energy sold during 1928 exceeded the previous year by 24.5 per cent., and the average price per kWh obtained fell from As. 2.7 to As. 2.44. Domestic supply improved by 6.2 per cent. only, but the stage had now been reached when more strenuous efforts might be adopted to increase the demand by catering for small consumers. Supplies for power increased by 38.4 per cent., and a marked increase in this direction might be expected. The demand for street lighting had increased by 8.4 per cent., but as most of the principal streets were now lighted by electricity, future development would be more in the use of lamps of greater candle-power than additions to the number of lamps. Good progress had been made with the erection of the new plant. The second 6,000-kW set was now running, one of the 60,000-lb. Babcock boilers had been completed, and the erection of the second was proceeding. A large storage pond some 10 acres in extent, for the circulating water for the turbines, had also been practically completed, and this would assure an ample water supply during the dry seasons. The report and accounts were adopted.

United River Plate Telephone Co., Ltd.

The revenue for the year ended December 31st, 1928, totalled £2,764,625, as compared with £2,550,523 in 1927, and the net profit (after meeting debenture interest) amounted to £489,617 (against £464,016). After paying the preference and interim ordinary dividends, and adding £165,002 brought forward, the available balance is £462,219. A final dividend of 5 per cent. is to be paid on the ordinary shares, again making 8 per cent. for the year, free of tax, and £158,219 is to be carried forward. The inability of the company to maintain the dividend without drawing on the amount brought forward is due to a reduction of tariffs forced upon it in the last quarter of 1928. No settlement of the rate question has yet been arrived at. Further progress has been made with the conversion of the Buenos Aires system to automatic working, and it is hoped that the work will soon be completed. Considerable attention has also been paid to other centres. In December last an offer was made by the International Telephone and Telegraph Corporation of New York to purchase the ordinary shares of the company upon certain terms, which offer was accepted by a majority of the shareholders. Mr. P. Cross, Major E. Quilter, and Mr. P. B. Lawson retired from the board, and their places were taken by Messrs. F. Gill, H. M. Pease, and K. E. Stockton. Mr. Gill was appointed chairman and Mr. Pease deputy-chairman. Mr. G. H. Nash was elected an additional director. The meeting was held on Tuesday last.

Calcutta Tramways Co., Ltd.

The annual meeting was held on June 13th, Mr. J. G. B. Stone (chairman) presiding. In moving the adoption of the report and accounts, the chairman said that nearly 90 per cent. of the total traffic receipts, amounting to £503,055, was taken by the tramways, the actual tramway earnings for the year showing an increase of £37,000. The monthly ticket issue continued to be very popular, and in order to induce greater use of the tramways during slack periods of the day, a system of cheap mid-day fares was inaugurated on March 1st last. The operation of the motor-omnibus system showed a working loss of nearly £13,000, but the reduction in mileage where possible on non-paying routes should effect economies. The board felt that the time would come when the system of transportation in Calcutta would be controlled by one authority, but in the meantime the company would give the additional facilities of travel which the 'bus service provided, even though this service in itself was unremunerative. The report and accounts were adopted.

Sphere Investment Trust, Ltd.

Presiding at the annual meeting on June 11th, Sir George A. Touche (chairman) said that the broadening of the company's interests was, in a great measure, accomplished, and the capital was well distributed over different countries and industries. The year under review showed a continuance of the advances in the quotations of securities, especially in equities as apart from prior charges. Towards the end of the year, however, values had to sustain the shock of a rise in the bank rate, as a result of the financial situation in America, coupled with the fear attaching to the outcome of the General Election and the Reparations Conference. Political events had made the outlook a little more uncertain. There would probably be a slackening of interest in British industrial securities and a discrimination in the number and character of new issues applying for public support. A diminution of financial activity appeared to be inevitable. The report and accounts were adopted.

Venezuela Telephone & Electrical Appliances Co., Ltd.

An extraordinary meeting of this company was held on June 10th, and Sir Alexander Roger (chairman), who presided, said that during the past two years the company had introduced the automatic system into the Caracas area. The conversion to automatic operation had been well received and it had been decided to introduce the system into other areas. Further telephone expansion was also suggested. It was therefore proposed to increase the capital by £320,000, which sum would meet requirements for two or three years ahead. The new capital would take the form of non-voting "A" ordinary shares of £1 each and arrangements had been made to offer immediately 140,000 on a *pro rata* basis to preference and ordinary shareholders. The issue would be made at par. The resolutions were adopted.

Rees-Roturbo Manufacturing Co., Ltd.

The gross trading profit for the year ended December 31st, 1928, was £11,068. After meeting debenture interest, the net deficit is £1,533, as compared with a net loss of £8,599 in 1927. As values of plant and machinery were written down under the capital reconstruction scheme, no provision has been made in this year's account for depreciation. The directors' report states that Rees-Stevens electrical equipment for railless-cars during the past two years has proved itself equal to most severe tests, and two of the largest railless-car fleets in Europe are now equipped with this system. During the latter part of the year under review severity of competition became more marked and extended to the company's general products, increasing the difficulty of obtaining work at remunerative prices, and these conditions still prevail.

Whitehall Electric Investments, Ltd.

The report for the year ended March 31st last reports that the profit of £2,738,793 realised upon the sale of the company's properties in Chile and Mexico to the American and Foreign Power Co. has been transferred to capital reserve. Against this reserve £625,000 has been charged in respect of a proposed premium of 5s. per preference share, and £729,313 has been written off debenture issue discount. The sale of the company's properties mentioned above resulted in the reduction of the gross income from £721,951 to £517,105. The net income is £292,193, and to it is added £80,000 brought forward, making £372,193. After meeting the preference dividend and adding profits previously applied in writing off discounts, &c., the available balance is £1,100,400. It is proposed to pay a dividend of 2 per cent. (against 4 per cent. last year) together with a bonus of 18 per cent., on the ordinary shares, leaving £100,400 to be carried forward.

Companies Struck Off the Register.

The names of the undermentioned companies have been struck off the Register, and they are thereby dissolved :—

Beaver Accumulator Co., Ltd.
Blackadda Radio Co., Ltd.
Gold Bow Enamel Wire Co., Ltd.
Pagets Radio Components, Ltd.
Radio and Electro-Technical Industries, Ltd.
Radiophones (1925), Ltd.
Telephos (1925), Ltd.
Wireless League Gazette Publishing Co., Ltd.

Globe Telegraph and Trust Co., Ltd.

The report for the year ended May 31st records a net profit of £347,390, to which is added £52,322 brought forward, making £399,712. A final dividend of 5s. per ordinary share is to be paid on June 30th, making 10 per cent., free of tax, for the year, leaving £77,371 to be carried forward. The report contains a list of investments, the principal being the Eastern Telegraph Co., Ltd. ordinary (nominal value £1,258,915), Eastern Extension, &c. (£973,200), and the Western Telegraph Co., Ltd. (£679,000). The directors propose the widening of the company's present restricted powers of investment to enable it to participate in the further development of communications and electrical enterprises.

Stock Exchange Notices.

The undermentioned have been ordered to be officially quoted :—

Brompton and Kensington Electricity Supply Co.—21,432 ordinary shares of £1 each, fully paid, Nos. 351,017 to 372,448.

Oriental Telephone and Electric Co.—140,833 ordinary shares of £1 each, fully paid, Nos. 428,992 to 569,824.

Underground Electric Railways Company of London.—4,702 ordinary shares of £1 each, fully paid, Nos. 7,159,907 to 7,164,608.

Dealings in the following have been allowed by the Committee under Rule 159 :—

Chelsea Electricity Supply Company.—8,989 ordinary shares of £1 each, fully paid, Nos. 425,489 to 434,477.

Underground Electric Railways Company of London.—285 ordinary shares of £1 each, fully paid, Nos. 7,164,609 to 7,164,893.

Mirrlees, Bickerton & Day, Ltd.

The net profit for the year ended March 31st last was £31,896 (against £20,162 in 1927-28). A balance of £5,829 brought forward is added, making £37,725. The dividend on the ordinary shares is raised from 6 to 7 per cent., and £8,504 remains to be carried forward.

James Keith & Blackman Co., Ltd.

After providing for debenture interest and preference dividend, the available balance for the year ended March 31st last is £49,740. It is proposed to place £12,000 to reserve, to pay a dividend of 15 per cent., less tax, on the ordinary shares (last year, 12½ per cent.), and to carry forward £13,740.

Yorkshire (West Riding) Electric Tramways Co., Ltd.

The directors have decided to pay an interim dividend of 3 per cent. on the 6 per cent. cumulative preference shares.

Guest, Keen & Nettlefolds, Ltd.

The profit for the year ended March 31st was £956,071, to which is added £232,490, brought forward. After payment of the dividend on the preference shares and 10 per cent. for the year, free of tax, on the ordinary shares, £243,855 is carried forward.

Lisbon Electric Tramways, Ltd.

The directors recommend a final dividend of 4 per cent., free of tax, on the ordinary shares, making 7 per cent., tax free, for the year, against 6 per cent.

Electric and General Investment Co., Ltd.

The first dividends since 1913-14 have been announced. These are 2s. per share on the ordinary shares (10 per cent. on the amount paid up) and 1s. per share on the deferred shares.

Ransomes, Sims & Jefferies, Ltd.

The accounts for the year ended March 31st last show a profit of £21,112 (after meeting depreciation, debenture interest, &c.), as compared with £19,835 in 1927-28. The addition of £52,822 brought forward makes available £73,934. An ordinary dividend of 2½ per cent. (as last year) is recommended, leaving £50,434 to be carried forward.

Hick, Hargreaves & Co., Ltd.

The report for the year ended March 31st last shows a net profit of £11,446, to which is added £474 brought forward, making £11,920. A dividend at the rate of 2½ per cent., less tax, is recommended, leaving £7,120 carried forward. The report states that although severe competition and low prices continue to prevail in all branches of the company's business, the turnover for the year has been considerably increased, and by exercising the most rigid economy a substantial increase in profit on trading has been earned. Whilst the value of contracts secured during the year shows an appreciable increase, the value of uncompleted work on the books is rather less than at the commencement of the year.

Cork Electric Supply Co., Ltd.

An interim dividend of 5 per cent., less tax, at 4s. on the ordinary shares, payable on July 31st, has been declared.

Quebec Power Co.

A dividend of $0.5 per share has been declared on the common shares for the quarter ending June 30th.

Northern Mexico Power and Development Co.

A dividend of 1 per cent. has been declared on the common stock.

Edison Bell, Ltd.

An interim dividend of 5 per cent. has been declared on the ordinary shares.

International Telephone and Telegraph Co.

A quarterly dividend of $0.50 per share has been declared on the no-par-value stock.

Austrian Companies.

The *Austrian Siemens-Schuckert Co.*, Vienna, which has declared a dividend of 6 per cent. for 1928, as in the previous year, reports having received important orders last year, both from the Austrian Federal Railways and the Vienna City Council, while the cable factory was well employed. The turnover in the early months of the new financial year was prejudiced by the unusually cold weather and the heavy snowfall, but there has since been an improvement.

The "*Elin*" *Co. for Electrical Industry*, Vienna, whose business is electrical manufacturing, the carrying on of power stations and participation in various other undertakings, states that the lack of orders from the Austrian railways was balanced by successes in the export business. The inland sales organisation was well occupied, and the report for 1928 mentions a series of large orders for power stations, electrical equipment and for railways. The accounts show net profits of 1,060,000 schillings, as compared with 700,000 sch. in the previous year, and the dividend remains at 10 per cent. on a larger capital.

German Companies.

The *Ferd. Schuchhardt* (*Berlin Telephone and Telegraph Works*) *Co.*, Berlin, in which the International Telephone and Telegraph Corporation recently became interested, is paying a dividend of 5 per cent. for 1928 as for the previous year. The report states that the orders received from the German authorities did not come up to expectations, but new branches were embarked upon, which led to a further extension of the export trade.

The *Accumulator Co.*, Berlin and Hagen, reports that in 1928 it suffered considerably from foreign competition. The export trade was handicapped by the high import duties of almost all countries, and, on the other hand, foreign rivals utilised the high profits obtained in their home markets for the purpose of disposing of their surplus output at exceedingly low prices in Germany and the export markets of the company. The company was compelled in March, 1928, to lower sale prices in spite of increasing wages and advancing prices of lead. The orders booked in the early months of 1928 slackened off, and this condition has prevailed down to the present time. Nevertheless, the dividend is to remain at 9 per cent.

The *C. Lorenz Co.*, Berlin, states that the lack of Reich orders in 1928 was compensated for by increased activity in the radio-telegraphy, broadcasting, and machine construction branches, the telegraph department in particular showing good results. The keen competition in the telephone branch greatly depressed prices, but the profits increased through the modernisation of manufacturing methods. As mentioned in a previous issue, the dividend remains at the rate of 6 per cent. on the old shares (6,270,000 marks). Shares for about 2,000,000 marks were recently taken over by the Philips Lamp Co., Eindhoven, Holland. Loud speakers, rectifiers, &c., which the Dutch company has hitherto exported to Germany are now to be made by the Lorenz Company.

Stocks and Shares.

MONDAY EVENING.

STOCK Exchange markets begin to give a little indication of the direction in which public speculation in stocks and shares may be expected to move, in the light of the changed situation induced by the accession of the Labour Party to power. From the investment point of view, it may be said that no particular trend or disposition of markets has manifested itself. The prices of securities, *qua* securities, have undergone but slight alteration as a sequel to the General Election Investment capital continues to flow steadily into the best-class stocks, and, although there is a complaint in the Stock Exchange about paucity of business, this is due to the seasonal conditions, the continuance of the high Bank Rate of 5½ per cent., and the uncertainty that still pervades the atmosphere in regard to American money matters.

Marconis Improve.

Marconis strengthened to 3¾ on the news that the application of the Venture Trust for an injunction against the Marconi Company had been dismissed with costs. The price had been down to 76s., and rose to 78s. 9d. The £1 shares are quoted at 87s. 6d., their value being reckoned as about 10s. above that of Marconi 10s. shares. Marines hardened to 3¼. The Eastern Cable group was scarcely affected, though Eastern ordinary came into demand at 266. The Globe Telegraph and Trust Company has declared its final dividend, making 10 per cent. free of tax for the year, and proposes to take powers for the widening of its business scope, this step being no doubt due to the merger.

Venezuela Telephone.

Dealings have now started in the new "A" non-voting shares of the Venezuela Telephone Company, issued at £1 apiece to proprietors of the existing ordinary and preference shares. The price of the new shares started at 3s. premium. This served to bring in a few sellers willing to take the premium as an extra dividend. Consequently the price eased off to 2s. 6d. premium. The old shares are quoted ex rights, and stand at 25s. 9d. for the ordinary and preference alike. The difference between the old and the new shares is that the former carry voting rights, which the others do not. Some people in the market contend that there should be no more than a shilling or 1s. 6d. difference between the prices of the two issues. It is impossible to state with precision what the extra value of the voting rights is, but to anyone who is taking an interest in the company's shares for the first time, it would certainly appear that the new at 22s. 6d. are cheaper than the old. Other telephone issues are quiet; International common stock remains at 250, and American Telephone and Telegraph at 217½ is 2½ points better on the week. Burndept Wireless are dull at 4s. 6d. International Automatic Telephones at 38s. 9d. show a small gain.

Radio and Gramophone.

The H.M.V. Gramophone Company has announced a new issue of shares to be offered to proprietors at £1 each, this showing an extremely handsome bonus, as the old shares are quoted at 17¼. The H.M.V. Company is controlled, of course, by the Radio Corporation of America, one of the most go-ahead and progressive industrial corporations of the day. The intention of the R.C.A. board is said to fall nothing short of obtaining a controlling interest, or at all events a large slice, in the business of supplying Great Britain and Europe with entertainments connected with the kinema and wireless industry. The day is coming, according to American experts, when there will be such developments in radio as are, at present, hardly conceived by people on this side of the Atlantic, and who do not realise the field which wireless offers for communication between ordinary private persons.

The R.C.A. and Western Electric.

The developments which are taking place to-day in the kinema trade, and in which the Western Electric Company is taking a lead, are plain pointers to what may be expected. These will bring in their train such an accession of orders to commercial firms as is likely to create something like a new branch of industry. The trouble is that developments follow so fast upon each other that the novelty of to-day is liable to be superseded by something else to-morrow, and companies are, therefore, in a quandary as to whether it is worth while laying down expensive plant and embarking upon large plans of capital expenditure, when scientific requirements may require something of a different character in the course of a few weeks. The Radio Corporation of America has announced a comprehensive policy for serving the United States through stations in 13 strategic cities to compete with the leading telegraph companies, this having been made possible by recent grants of ten exclusive wireless channels. Two of the principal American companies in the business are the Western Electric and the R.C.A. Communications—the latter being owned by the Radio Corporation of America.

Electricity Supply.

A feature amongst electricity supply shares is a spurt in Northamptons, which were 47s. this time last week, and are now 52s. 6d. The story goes that the Greater London and Counties Trust is angling for control of the company, and may be expected to make a substantial bid for the shares. The report is accepted in the Stock Exchange with reserve, for it has been noticed on previous occasions that such gossip is wont to fix upon the wrong company, and that when an offer is made for shares it comes, as a rule, from some unexpected direction. The Northampton Electric Light Company occupies, however, such a geographical position as to render its possible acquisition by the American interests a reasonable proposition, and this no doubt has lent colour to the rumour just mentioned.

Clyde Valley shares have moved up 1s. 3d., following upon their florin rise of last week, and now stand at 37s. The new have risen 9d. to 16s. 3d. premium. Richmonds at 46s. 3d. are a few pence lower; while, on the other hand, Lancashire Electric new ordinary at 28s. 6d. are slightly firmer.

Electrical Equipment.

There has been considerable activity in the shares of the companies dealing with electrical equipment, and amongst these, Callenders at 73s. 9d., now ex dividend and ex bonus, show a substantial rise on the week. The shares have been closely followed, as regards interest, by General Electrics, for which there was renewed demand from America, raising the price 1s. 3d. to 53s. 9d. The 7 per cent. debenture is better at 104½. Associated Electrical Industries, at 52s., have fallen behind General Electrics, with which, of course, they have been recently racing neck and neck. India-Rubber, Gutta-Percha shares came up from 13s. 9d. to 17s. before reverting to the previous price on the issue of a report which was regarded as disappointing. Expectations had been raised of a very good showing being made by the figures, but the directors frankly state that the actual results are still far from satisfactory. Economies are expected to follow the reorganisation of steam and power plant at Silvertown, and an increase in profits is reported from the foreign branches. Henleys are again better at 6½. Siemens ordinary have gone back to 31s. 3d., the preference holding their improvement to 32s. 6d. Telephone Manufacturing shares are steady at 5s. 9d. British Insulated Cables are 1/16 up at 73s. 9d.

Undergrounds Lower.

Underground Electric Railways of London income bonds are flat, the price having given way to 108, the shares going back to 22s. 6d. This is because of the opposition raised to the London Traffic Bills—opposition that apparently caused uneasiness in the minds of shareholders, and led to selling of the bonds. The price of the shares automatically follows, owing to the conversion rights of the bonds into shares. The market is dull and heavy, selling having been accelerated by an unfortunately-worded newspaper paragraph which suggested that the bonds are a shrinking investment, whereas the fact is that they can be converted into shares up to June 30th, 1930. The other Underground stocks show no particular change. The Southern Railway announces a further important extension of its electrification system, but this has had no effect upon the prices of the company's securities.

"Dollar" Stocks Strong.

Brazilian Tractions at 58 are 2 dollars better, and the preferred at 190 are 15 up. Dollar stocks as a whole show improvements. A gain of 10 points in Consolidated Gas, Electric Light and Power of Baltimore common lifted the price to 110½. Power Securities Corporation 7 per cent. preference improved to 25s. 9d. Pennsylvania Water and Power rose 5 to 91½; Shawinigan at 83½ is also 5 up. The East African Light and Power Company declares a dividend making 6½ per cent., which goes against 6 per cent. in the previous twelve months, and the price is a little better at 31s. 6d. Southern Brazilian Electric 6½ per cent. mortgage debentures hardened to 82½, and Southern Electric Railways of Buenos Ayres 6½ per cent. bonds at 96½ show a gain of £1. Anglo-Argentine Tramways first preference shares are 1/16 lower at 3 9/16, which leaves the second preferences higher than the first, the dividends being 6 and 5½ per cent. respectively. Mexican industrials are distinctly harder. There is a general impression that Mexico is once more settling down into something like peacefulness. Rio Tramways firsts strengthened to 97½.

British Traction.

British Electric Traction deferred ordinary stock has gained no more than 50 points this week, as against the 300 which the stock secured in the preceding fortnight. The present price is 1,400, and around this figure a fair amount of business has been done. London and Suburban Traction preferences are weak for the same reason as that which has affected Underground Electric Railways, and the London transport section as a whole has been disposed to dullness. The iron and steel shares also are disposed to ease off, Vickers being 9s. 10½d. Rubber shares have hardly stirred.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1927.	1928.	Price June 17 1929.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	65/9	—	4 11 4
Brompton Ordinary	1	8½	8½	26/-	—	5 7 8
Charing Cross Ordinary	1	8½	8½	26/6	+6d.	5 5 8
do. do. 4½% Pref. ...	1	4½	4½	17/6	—	5 2 10
Chelsea	1	8¼	8¼	26/6	—	5 5 8
City of London	1		10	33/3	—	4 4 6
do. do. 6% Pref.... ...	1		6	23/-	—	5 4 4
Clyde Valley	1		8	36/3	+6d.	... ...
County of London	£1	7½	10	55/6	—	3 12 9
do. do. 6% Pref.... ...	1	6	6	23/-	—	5 4 4
Edmundson's 7% Pref. ...	1	7	7	25/-	—	5 12 0
Elec. Supply Corporation	1	11	—	56/3	—	3 18
Kensington Ordinary	1	8	8	26/6	—	5 5 8
Lancs. Light and Power	1	7½	7½	29/-xd	+1/-	5 3 5
London Electric	1	8½	9	28/-	—	5 0 0
Metropolitan	1	9	9	47/6	—	3 16 0
do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Midland Counties	1	6½	6½	34/-	—	3 16 6
Mid. Elec. Power	1	15	8	37/6	—	4 5 4
Newcastle on-Tyne Ordinary ...	1	6	6	27/-	—	4 9 0
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	11	—	5 9 1
North Met. Elec. 6% Pref.	1	6	6	23/-	—	5 4 4
St. James' and Pall Mall	1	8	8	27/6	—	5 1 10
Scottish Power	1	8	8	33/-	+1/-	4 17 0
South London	1	8½	8½	26/6	—	5 5 8
Urban Ordinary	1	7	—	2	—	... ...
Westminster Ordinary	1	8½	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref. ...	1	7½	7½	24/9	—	6 1 2
Yorkshire Elec.	1	8	8	36/6	—	4 7 6

HOME RAILS.

Central London Ord. Assented ...	Stock	4	4	73	—	5 9 7
Metropolitan	"	8	9½	60½	—	5 15 8
do. District	"	4	5	76½	—	6 10 9
Underground Electric	£1	5	7	22/6	—6d.	5 4 5
do. do. Income ...	Bonds	6	6	108	—3	5 11 1

TELEGRAPHS AND TELEPHONES.

Anglo-Am. Tel. Pref.	Stock	6	6	103	—	5 16 6
do. Def.	"	1½	1½	24½	—	6 2 6
Automatic Telephone	1	10	12½	2⅛	—	6 1 1
Eastern Extension	10	10	10	26½	—½	*3 15 6
Eastern Tel. Ord.	Stock	10	10	265	—5	*3 15 6
Globe Tel. and T. Ord.	10	10	10	27½	—½	*3 12 0
do. do. Pref.	10	6	6	11⅛	—	5 5 6
Great Northern Tel.	10	20	—	3⅛	—	... ...
Indo-European	25	10	10	50½	—	*4 19 0
Marconi	10/-	10	20	5⅛	+1/32	... ...
Marconi-Marine	1	12½	15	3 7/16	+1/16	4 12 4
Oriental Telephone Ord.	1	12	12	3 1/16	+1/32	... ...
Western Telegraph	10	10	10	26½	—½	3 15 6

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	3 5/16	—1/32	7 14 4
do. do. 2nd Pref. ...	5	6	6	3⅜	—	8 5 6
do. do. 5% Deb. ...	Stock	5	5	74½	—	6 14 3
British Electric Traction Def. Ord.	"	5	5	1400	+50	... ...
do. do. Pref. Ord.	"	8	8	130½	—	6 2 7
Brazil Traction	100	7	8	58½	+½	3 10 10
Brit. Columbia Elec. Rly. Pcc. ...	Stock	5	5	94	—	5 5 10
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	11/6	—6d.	... ...
London United Tram Deb. ...	Stock	4	4	64	—	6 9 1
Mexico Trams, 5% Bonds	—	5	5	75½	+1	6 12 9
Mexican Light Common	100	Nil	Nil	74½	+2	... ...
do. 7% Pref.	100	7	7	74½	—	9 8 0
do. 1st Bonds	—	5	5	77½	+2	6 9 0
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	... ...

MANUFACTURING COMPANIES.

		1926.	1927.			
Assoc. Elec. Ord.	1	—	6	52/-	—	2 6 2
Babcock & Wilcox	1	13	15	68/9	—	*4 14 4
British Aluminium Ord.	1	10	10	51/3	—	*3 18 9
British Elec. Transformer Pref. ...	1	7	7	18/9	—	9 6 8
British Insulated Ord.	1	15	15	3½	+1/16	4 1 8
Brush Ord.	1	10	10	27/6	—	7 5 6
Callenders	1	15	15	3½xr	—	... ...
do. 6½% Pref.	1	6½	6½	1⅛	—	5 4 0
Crompton Parkinson Ord.	5/-	—	—	1	—	... ...
do. 8% Pref.	1	—	8	25/-	—	6 8 0
Edison-Swan 1st Pref.	1	7½	7½	25/9	—	7 1 2
do. 5% Deb.	Stock	5	5	86½	—	5 15 7
Electric Construction	1	7½	5½	18/9	—	5 17 4
Enfield Cable Ord.	1	20	20	4½	—	4 14 1
English Electric	1	Nil	Nil	6/8	—	... ...
do. do. Pref.	1	8	Nil	8/3	—	... ...
Gen. Elec. Pref.	1	6½	6½	23/-xd	—	5 13 1
do. Ord.	1	7½	10	2½	+1/8	3 14 9
Henley...	1	25	25	6½	+1/4	3 17 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	16/8	+½	... ...
Johnson & Phillips	1	12½	10	36/3	—	5 10 4
Siemens Ord.	1	7½	7½	31/3	—1/8	4 16 0
Telegraph Construction	12	10	10	24½	—	*4 19 3

* Dividends paid free of Income Tax.

Economic Conditions in Belgium.

Considerable Electrical Progress Reported.

WE have received from the Department of Overseas Trade a report on economic and trade conditions in Belgium during 1928 by Mr. N. S. Reyntiens, O.B.E.,* who recently succeeded Mr. J. Picton Bagge as Commercial Secretary at the Brussels Embassy.

In his introductory remarks, Mr. Reyntiens states that the note of optimism struck by Mr. Picton Bagge in his last report has been more than justified. Practically all industries are flourishing (with the possible exception of the linen industry), and unemployment is practically non-existent. The country's financial position is strong, and the National Bank reduced its discount rate from 4½ to 4 per cent. during the year. The metallurgical industry enjoyed prosperity; the production of steel, pig iron, and zinc is continually increasing, and order books are well filled. The electrical industry has developed considerably, and this is in no small measure due to the extended use not only of electric light, but also of electric power even in the remotest villages. The marked movement towards the re-establishment of home industries has also contributed to this prosperity.

The future of Belgium is distinctly bright. Public and private finance are sound, industry and commerce are in a flourishing condition, vast improvements in water and road communications may be expected, the port of Antwerp has been greatly improved, and the railways, in spite of low tariffs, are worked at a profit. Although British export trade to Belgium still suffers from high prices, it is satisfactory to note that British exports have increased in quantity and value. The general increase in wages has increased individual purchasing power, and remissions of taxation are anticipated; British trade should eventually benefit from these facts.

Electrical Development.

The use of electricity made further progress during 1928. The effects of the stabilisation of the currency again induced consumers to use electrical energy for power purposes, while largely as the result of propaganda there was an increased domestic consumption. The distribution network continues to spread, and the construction of a h.p. line between Louvain and Liège has completed the linking up of the eastern and western parts of the country. A line connecting the new central station at Schelle with the stations of the Charleroi basin is in process of construction; this will effect a junction between northern and southern Belgium. Other important interconnections are being made. There are now 25,000 km. of high- and low-pressure lines; of 2,700 communes no fewer than 2,150 are now supplied with electricity, placing it at the disposal of about 92 per cent. of the population. Precise figures of the production of electricity are not available, but that from public stations is put at 1,300 million kWh, and industrial stations are credited with 2 million kWh, the total representing 415 kWh per head of the population.

Public authorities are taking a lively interest in the use of electricity, either by means of subsidies for the construction of lines, as in the case of Eastern Flanders and the provinces of Luxemburg and Namur, or by participating in the formation of associations of communes for the purpose of exploiting a system, as has happened in the Provinces of Antwerp, Limburg, Liège, Hainaut, and Western Flanders. The province of Brabant, co-operating with about 80 communes, has just formed an association which will serve nearly all the communes hitherto unprovided with electricity. Financial stabilisation has necessitated an increase in the prices charged for electricity, the mean of which was 50 centimes per kWh in 1914, and 1.90 fr. before stabilisation. The index figure now shows a multiple of 8.5, and negotiations have been entered into by distributors and communes which will probably tend to fix the average price at 2.70 fr. per kWh. Centralisation in this industry is again noticeable, and the union of Liège power stations has been joined by the power stations of Namur and Luxemburg with the title of "Linalux." Distributing companies have founded the Union Belge des Producteurs d'Electricité, whose aim is to group all producers without infringing the unacquired rights. Further mergers will probably take place in 1929 with a view to a community of interest and consequent further development of the industry.

Rural Electrification.

In small farming the use of electricity has not made up for the shortage of farm hands to the same extent as in large-scale farming. The installation of public and private electric lighting and electrically-driven dairy, pumping, grinding, laundry, root cutting and threshing machinery has had considerable extension, especially in villages. The demand keeps pace with the installation facilities and modern improvements in apparatus. An instance is given in Southern Belgium, where 27 villages were connected up in 1928. Out of 2,385 potential clients 1,974, or 82.5 per cent. made use of the new facilities. In the Limburg province this work, which was begun in 1921, will be finished by the end of 1929. By then 722 km. of line will have been installed. At the date of the report 595 km. of line was in use, furnishing 85 per cent. of the population of the province with electricity. Lectures on elementary electricity and the installation of appliances, organised under official auspices, have been well attended since 1925.

Communications and Broadcasting.

The telegraph system comprised 43,704 km. of lines on December 31st, 1928; of these submarine cables between the United Kingdom and Belgium represented 502 km. It is intended to replace the overhead lines between Antwerp and Charleroi and Liège by underground cables. A Bill has been placed before the Senate providing for the formation of a "Régie," placing the telegraph and telephone systems on an industrial basis, as has been done with the railways.

On October 31st, 1928, the number of telephone subscribers was 167,998, and the number of exchanges was 407. This presents an increase in one year of 22,673 subscribers and 8 exchanges. New overhead lines for inland traffic with a length of 2,346 km, and with a length of 300 km. for international traffic, were erected during the period January 1st-October 31st, 1928. There are now seven automatic exchanges in the Brussels area, which has been entirely served by this system since October 15th, 1928. Other exchanges will be built in the capital to satisfy the ever-increasing demand. Telephonic communication has now been opened without restrictions with Cuba, Spain, the United States, the Irish Free State, Norway, Portugal, and the principal towns of Canada and Mexico. The partial service with Germany and Sweden has now been extended to the whole system of those countries.

As the local broadcasting programmes are generally considered inadequate, there is only a limited demand for single-valve receiving sets. The bulk of the country's requirements of radio apparatus are met by one of the large concerns which employs about 350 workers and makes receiving and transmitting sets and parts and apparatus of all descriptions. French and German competition is intense, but American importers have found it difficult to obtain a footing in the market owing to the fact that their sets are not suitable. Expensive first-class sets with not fewer than four valves (including portable types) of British origin sell very well. There is scope for highly-decorative British furniture cabinet sets. There is usually a good demand for accessories such as loud speakers, batteries, and novelties of United Kingdom origin. Several prominent British firms are well represented, and in these lines do good business in Belgium.

Miscellaneous.

Considerable improvements are being made in the ports of Antwerp, Brussels, and Ghent. At the first port additions were made during the year to the hoisting apparatus, including 12 three-ton electric cranes. This year 58 similar cranes are being installed, as well as 5 five-ton cranes. The Port Arthur dock at Ghent was equipped with 12 three-ton cranes, and this year a further 20 are being added, as well as a 30-ton floating electric crane. Tenders were to be invited this year for the construction of a sub-station, &c., and the installation of cranes in the Avant-Port, Brussels.

As most industries now have wage agreements based on the cost of living, wages showed a steady increase during 1928. The percentage of unemployment in a representative group fell from 2.2 per cent. in January to 0.6 per cent. in October, 1928. The "family allowance" system continues to progress, and a Bill compelling successful tenderers for public contracts to pay these allowances became law in April last year. There is no doubt that the movement will expand still further when the effects of the new law are fully felt.

Special attention has been paid by the coal industry to the use of pulverised coal and the extraction of valuable by-products and their sale to industry for power, lighting, agricultural, and industrial purposes. Close co-operation of banking, chemical and electrical interests has been effected for this purpose.

In an appendix to the report dealing with Luxemburg it is stated that a law of January 4th, 1928, approved the agreement entered into by the Government with a French company on November 11th, 1927, whereby a concession was granted to the latter for the construction and operation of lines for the distribution of electric power and light. The law authorised the Government to issue a loan for 25 million fr. in connection therewith. The duration of the concession is 30 years, and is renewable by tacit consent for further periods of 10 years, unless one of the parties notifies to the other its intention of abandoning it. Such notification must be given at least three years before the expiry of each period. The concession constitutes practically a monopoly.

Statistics of Belgium's foreign electrical trade during 1928 appeared in our issue of March 29th (p. 581).

* Stationery Office, 4s. 6d. net.

The I.M.E.A. Convention—IV.

A Report of the Proceedings and Social Functions at the Annual Convention at Torquay.

IT was a happy idea of the I.M.E.A. Council to introduce into its programme at Bath last year a "Women's Day." This new feature was continued at Torquay. It must not be regarded merely as a graceful gesture—due to women for the interest they have always taken in I.M.E.A. Conventions—but rather as official recognition of the important part they must play in promoting the use of electricity in the home. The outlook of women in this sphere is bound to be more practical than that of men, since women alone possess training for and experience of housekeeping. Moreover they have the right to decide what kind of household appliances they shall use.

Fig. 1.—The Scene of Many Meetings.

It is, we think, now generally accepted that domestic uses of electricity offer great opportunities for increasing both output and load factor, but it is not so fully realised that, in the opinion of many leading engineers, the potentialities in this direction are greater than in any other. This view is ascribed to Dr. S. Z. de Ferranti, President of the British Electrical Development Association, among others, as well as its corollary that women's help to this end is essential. As an illustration, it is said by experienced show-room managers that they prefer not to sell or hire electrical apparatus to men unless their wives have first approved of the actual article. Dr. Ferranti's name is mentioned, not only because his interest in the subject—based on practical experience—is well known, but because, throughout a period of some forty years, his views as to the future trend of electricity supply generally have proved so consistently correct that his opinion in this particular may be regarded as a fortunate omen for the future of the Electrical Association for Women. Attention may here be suitably directed to two points in his contribution to the discussion on Mr. Jennings' paper on tariffs. One was the necessity for a two-part tariff with the primary charge as high as might be necessary to allow the running charge to be as low as possible; the other was the importance of good service to consumers.

"Women's Day" at Torquay opened with a lecture by Miss M. Partridge, B.Sc., on "Women's Work in connection with Rural Electrification in Devonshire," at which Mrs. Nichols Moore presided. To illustrate her remarks Miss Partridge showed a map of Devon, indicating the villages to be linked up to receive supplies in bulk from Torquay, Exeter and Plymouth. Miss Partridge referred to the developments that have taken place within the last two years and expressed the view that many of the villages referred to would be electrified within another two years. The former industrial prosperity of Devon depended on water-power and faded away with the coming of steam. It could be revived when electricity became available, but in that case there would be no need for unhealthy factories in congested areas. Electricity would enable small home industries, such as weaving, to come once more into their own amid healthy rural surroundings.

The possibility of obtaining a supply of electricity would depend upon the magnitude of the demand and women could, by educating the public, help to create such a demand. For electricity to be cheap, overhead lines must be used. Those who did not like the appearance of the poles could train roses to grow up them or else get used to them.

We are disposed to agree with Miss Partridge's implication that it is only a question of time before overhead electric lines are accepted as part of the natural order of things and perhaps even more than that. There is, we believe, a society in Holland for the preservation of old windmills, which, no doubt, when erected were considered disfigurements of the rural landscape. Turner showed us the beauty of steam-trains and modern Pennellesque art indicates that even iron-works have their splendid aspects.

Miss Partridge related how she had trained a number of girl apprentices and had found them not only very apt at their work, but also of great help in overcoming the fear of electricity in the rustic mind. The argument was that if a girl could carry out wiring and replace a fuse anybody could do so. Many women house-

Fig. 2.—Mr. E. A. Edwards at a Short Hole.

Fig. 3.—Mr. and Mrs. Ayton, of Winchester, with Miss Edwards.

keepers preferred girls to wire their houses as they did not make so much mess as men with dirty boots.

Miss C. Haslett, Director of the E.A.W., referred to the new field of work for women opened up by Miss Partridge, who had done so much for the electrical development of rural Devon.

The vote of thanks to Miss Partridge was proposed by Mrs. Beale, President of the Birmingham Branch of the E.A.W., and seconded by Lady Snell.

The lecture was followed by a private view of the Exhibition at Old Torbay Hospital and later by a luncheon party at Addison's Café. In the afternoon eleven motor coaches, kindly placed at the disposal of the E.A.W. by the Torquay Corporation, conveyed the party to Widecombe-in-the-Moor, where tea was taken, once more as the guests of the Torquay Corporation.

The visit to the Longpark Pottery made a break in the journey that was full of interest to those who took part in it. Suitable mementos of the occasion were kindly presented by the proprietors of the pottery.

Fig. 5.—The Ladies' Bathing Beach as seen from the Medical Baths.

The Heavy Oil Engine.

Discussion on Mr. G. Porter's Paper.

Mr. Mellor (Messrs. Fraser & Chalmers, Ltd.) did not agree with the author (an abstract of whose paper was published last week) that the oil engine in this country had languished under the shadow of the progress of steam turbines. On the contrary, he claimed that steam-turbine designers had been spurred to valiant efforts to maintain relative progress in overall thermal efficiency and generating cost per kWh produced with those which the modern oil engine could give. To-day oil engines 25 years old were giving high thermal efficiency and good mechanical behaviour. Progress in metallurgy had reduced the cost of maintenance considerably, and to-day it was possible to give a definite assurance that thermal and mechanical efficiencies would remain at higher levels than with any other prime mover over a given number of years, which could not be said of a steam-turbine installation, the efficiency of which decreased as wear and tear of nozzles and blades took place. It had always puzzled him why large electrical undertakings had not been the foremost users of heavy-oil engines, which had proved to be the most economical heat prime movers known to industry. It might be a surprise to many to know that in London over 10,000 b.h.p. of oil-engine plant was used specially to deal with peak loads and to supply special theatre mains, which (due to the L.C.C. by-laws) were entirely separate from the ordinary supply mains. Underground in the West End of London was an oil-engine power station capable of dealing at present with 5,000 kW, and eventually with 7,000 kW, for the special service mentioned above. The room was 120 ft. long, 36 ft. wide, and 21 ft. high, and yet there was ample room for reconditioning and dismantling. All auxiliaries were in the same space, switchboards and controls being on the floor above. Fuel storage, filtering, and water-softening plant, together with a cooling tower and exhaust silencers, had been found accommodation without even the passer-by having any knowledge that such plant was in operation. Could they not visualise similar, but much larger, underground stations placed in similar unobtrusive positions in crowded industrial centres? Dealing with the relative costs of steam and oil plant, Mr. Mellor suggested that the author's figure was very high for cost for oil engines and generators. It was possible to-day to buy oil engines for £7 5s. per b.h.p., and suitable alternators for £2 5s. per kW; for a station of 20,000 kW, 7 oil engines of 4,200 b.h.p. each could be bought for £220,000, and 7 alternators of 3,000 kW each could be bought for £53,000, or a total of £300,000, adding 10 per cent. for contingencies on the engines. Recently he had had to prepare a complete scheme in detail for a 12,500-kW (maximum) oil-engine station with an annual output of 50,000,000 kWh, representing a 57 per cent. load factor with an output of 10,000 kW. The capital cost of five engines and alternators, together with that of the full station equipment, foundations, buildings, cranes and storage tanks, amounted to £239,000, and the total running costs were estimated at 0.301d. per kWh generated. It was very difficult to arrive at a figure for rates, taxes, depreciation, profit, &c., but eventually he computed it at £75,000, which brought the running cost up to 0.65d. per kWh. There were five good steam stations with outputs of approximately 50 million kWh per annum each, whose average cost for the past year was 0.576d. per kWh. One London station had a figure of 1.56d. per kWh for 59 million kWh per annum, but he had not included it in the five he had mentioned. Personally, he regarded his estimate as high, and if fuel could be purchased at £3 per ton, which was not unlikely, the figure would be something below 0.6d. per kWh. Whilst pulverised fuel was lessening the cost of coal for electrical generation, parallel efforts were being made to reduce the cost of fuel oil, and in matters relating to the hydrogenation of coal and low-temperature carbonisation for the production of oil this country was not lagging behind other countries. At the moment it would be nonsensical to suggest that the oil-engine power station would have as low a total working cost per kWh as the high-efficiency base-load station using pulverised fuel, but he looked forward to the time when the production of fuel oil at the pithead would bring about a lower price of fuel oil and render oil-fuel cost per kWh unassailable. Surely the Commissioners could, without lessening their patriotism towards coal, delve more sympathetically into the economical status of the large oil-engine power station for bulk supply,

Fig. 4.—A Window of Messrs. Bobby & Co., Ltd.

Fig. 6.—The Town Hall by Night.

peak load, and standby? They would find no engineering reasons to excuse their neglect of the oil engine; furthermore, they would find throughout the country many centres which could be provided with power at a lower cost than that quoted by the author, *viz.*, £3 per kW and 0.25d. per kWh. This country was the pioneer of the internal-combustion engine just as much as it was of the steam turbine; why, then, should not the oil-engine industry receive the same impetus in the development of larger sets for power-station work as the steam turbine? The Electricity Commissioners were the servants of the public, and it was their duty to perform their function by thoroughly investigating whether large oil-engine stations could be efficiently used for public service. There

Fig. 7.—The Pavilion under Floodlight.

Fig. 8.—A Corporation Tramcar.

were 25,000 employés in this country (engaged on oil-engine construction) and in a national scheme like the electricity scheme of the Government they deserved similar consideration to that which had automatically fallen to the lot of their steam-turbine colleagues. The Government and the Electricity Commissioners would be doing national service when they asked for the co-operation of oil-engine manufacturers by inviting them to build sets which would never betray the national service to which the Commissioners themselves were committed.

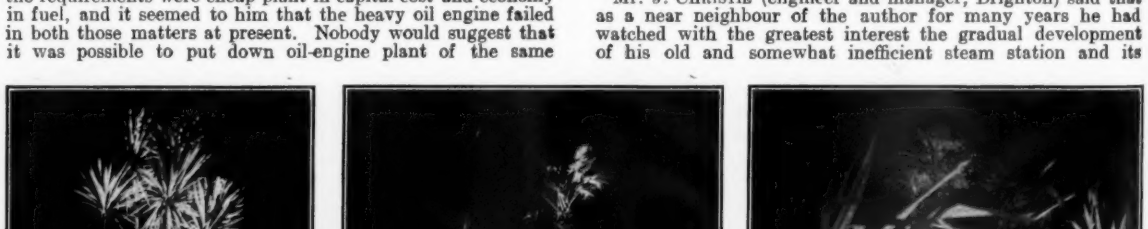
Mr. I. V. ROBINSON (B.E.A.M.A.) was not an exponent of either the internal-combustion engine or the steam turbine, but wished to call attention to a few facts upon which engineers had to base their opinions when dealing with the relative merits of oil engines and steam plant for particular purposes. Having had to go into the economics of plant for peak-load purposes in connection with a paper for the World Power Conference sectional meeting at Tokio, he had ascertained that the requirements were cheap plant in capital cost and economy in fuel, and it seemed to him that the heavy oil engine failed in both those matters at present. Nobody would suggest that it was possible to put down oil-engine plant of the same

rating which had a maximum rating of 160,000 kW for a short period. Both types of plant were equally reliable; as regarded flexibility, he believed steam plant would hold its own, and as regarded cost the internal-combustion engine would be able to make a good show provided a high-speed supercharged engine could be developed.

The PRESIDENT then introduced Mr. Maximilian Gercke, of the M.A.N. Co., of Germany, who had come over specially from Nurnberg to support Mr. G. Porter.

Mr. M. GERCKE emphasised the need for close collaboration between oil-burning and coal-burning stations in order to produce electricity as cheaply and efficiently as possible. The proposal to use steam at the base-load stations and to have local Diesel installations as stand-by and phase-rectifying sets had been applied with remarkable success in some Continental districts, especially in Hamburg and Berlin, both of which had been mentioned by the author. The Hamburg station had thus saved some 5,000 tons of coal last winter season, in addition to saving the situation on several occasions when the supply was threatened with interference through ice trouble in the condensers of the steam installation. There were great possibilities of developing the heavy-oil engine in Great Britain by using coal-tar products for Diesel engines. The production of coal tar in this country was very considerable, and would be sufficient to operate large peak-load installations with coal-tar oil, and thus obviate the import of foreign Diesel oils. Referring to the rapid development of the high-powered Diesel engine, he said that in one week recently the M.A.N. Co. booked orders amounting to 36,000 b.h.p., including a tenth repeat order for a 4,000-kW set for the Chilean Nitrate Co.

Mr. J. CHRISTIE (engineer and manager, Brighton) said that as a near neighbour of the author for many years he had watched with the greatest interest the gradual development of his old and somewhat inefficient steam station and its



Figs. 9, 10 and 11.—Flood-lighting Effects in the Royal Terrace Gardens.

capacity as cheaply as steam plant. The efficiency of oil engines was better, and Mr. Porter did not claim as much credit for that as he would have expected him to do, but the great desideratum was the reduction of capital cost, and the paper held out some hope in that direction, because it stated that high-speed oil engines could be sold at about 60 per cent. of the price of low-speed engines. That would bring the working costs to about the same as those of steam plant, and it appeared to him, therefore, that the future of the internal-combustion engine was based upon the high-speed engine and some form of supercharging. At the same time, there was no reason why the ratio of maximum to normal rating of steam turbines should be fixed at 25 per cent., which was the usual; as a matter of fact, at the Hell Gate station in New York there was plant of from 80,000 to 90,000 kW normal ultimate replacement and extension by modern Diesel plant which, for its size, was one of the most completely equipped and efficient Diesel-engine stations in the country, and the results achieved there stood second to none. Mr. Porter, however, would not be allowed to extend that station, and under the "grid" system would take his additional power in bulk from the Southwick station of the Brighton Corporation. The supplementary supply from that source would be a comparatively small, but gradually increasing, quantity, and the demand so taken would be operated as a base load on the highest possible load factor, and the seasonal peaks would be met by running the efficient Diesel plant as and when required. The author had made out a most excellent case for Diesel engines and their more extended use as emergency and peak-load spares, even on a big scale, for use in connection

with super-power stations supplying the national "grid" system. He had recently read in connection with the high-voltage supply system in Palestine and around Jerusalem from the hydro-electric scheme now under construction, that Diesel-engine-driven stations were being used for developing the demand in the outlying areas, pending the construction of the high-voltage transmission lines with static sub-stations in the early stages. When such stations as that of the author were shut down he suggested that the highly efficient plant might be utilised by the Central Electricity Board for developing the demand in the outlying areas in this country until the demand justified the heavy capital expenditure of extending the "grid." Mr. Christie said he could not speak personally with much authority of the operation of Diesel-engine plant, his only experience having been of a comparatively small semi-Diesel equipment put down some three years ago to supply a large institution under the control of the Brighton Corporation, but outside the limits of its area of supply. Three 50-kW sets last year generated approximately 275,000 kWh on a load factor of 30 per cent. at an "all-in" works cost of 1.07d. per kWh, or 2.06d. per kWh, including all capital charges and expenses on a most generous scale for all sorts of equipment and maintenance which were hardly chargeable to the cost of generation. The company supplying in that area charged 10d. per kWh for lighting and from 5½d. to 3½d. per kWh for power, so that there was still a wide field for isolated plant under favourable conditions.

Mr. H. W. WATTS (engineer, Epsom) said that in his station a Diesel engine was installed in 1912; a new up-to-date engine now being installed, of the double-acting 2-stroke type, was of 150 per cent. greater power, but occupied less space than the older plant, which fact was an indication of the progress made in the construction of that type of prime mover. For power station work the dice had been loaded against the Diesel engine by the very short loan repayment period allowed, and now sanction to extend such plant was withheld altogether. Yet, with its higher thermal efficiency, the Diesel engine was a serious competitor of the best steam plant. It had become a debatable question whether it would prove economical to transmit electrical energy over long distances to meet the peaks, and it became a question of what type of plant would efficiently generate the energy required at a point as close as possible to where it would be required. The Diesel engine, being better in thermal efficiency than up-to-date steam plant, was definitely suitable for that purpose. New plant could be installed for £11 per kW, and at 8 per cent. for interest and depreciation that worked out roughly at £1 per annum, whereas bulk-supply authorities found it necessary to charge often considerably more than £4 per kW of maximum demand; thus there would be a considerable saving with Diesel plant. He had received quotations from British manufacturers of Diesel engines for a 5,000-kW set for £11 per kW, and had been offered a figure of consumption of 0.47 lb. of fuel per kW, which was lower than any given in the paper. After mentioning the poor thermal efficiencies of many of the steam stations in the S.E. England Electricity District, Mr. Watts suggested that the author had been too optimistic as regarded his figures of steam station fuel costs. There was not a steam station in the South of England which could show the costs set out in the paper, not even Barking, with its thermal efficiency of 19.145 per cent. On the other hand, at Epsom he himself was getting the oil-fuel costs mentioned in the paper, and any heavy-oil plant should easily get such results. He asked all station engineers using steam plant, and particularly those who would have the control of selected stations, to consider very carefully the use of oil engines for taking care of the peak loads. The only disadvantage of the Diesel engine at present was that the oil had to come from oversea, but that could be got over in cases of emergency by ample storage, and it should be remembered that, bulk for bulk, it could be stored in far less space than coal, and there were no ashes. One power company had had to acquire 32 acres of land to dispose of its ashes.

Mr. C. M. JOHNSTONE (engineer, Shrewsbury) pointed out that the paper seemed to suggest that above a speed of 250 r.p.m. the author would advise the adoption of very high speeds of rotation and exclude the possibility of the satisfactory performance of engines running at medium speeds and specially designed for central-station work. In 1923 there were installed at Shrewsbury two low-speed engines of 250 h.p. each which had given every satisfaction, and in 1927 and 1928 they were added to by the installation of two 6-cylinder, 600-h.p. sets, which had given excellent results, running at 350 r.p.m. Those two engines were of the four-stroke type with air injection. The bore and stroke were 15 in. and 17 in., respectively, and the mean effective pressure at full load was 93 lb. per sq. in. The compression pressure was 460 lb. per sq. in., and the firing pressure 500 lb. The piston speed was 990 ft. per minute. The compressor was incorporated in the engine and mounted in line with the cylinders at the end remote from the generator. Several sets had been supplied, or were in course of construction. The generating cost at Shrewsbury with an output of 2,322,340 kWh per annum, a load factor of 28.5 per cent., a running plant load factor of 66.07 per cent., and a fuel price of 93s. 3d. per ton, was 0.569d. per kWh, and owing to that low cost the Shrewsbury Corporation was able to sell energy at rates which were among the lowest in the country. The author had not touched upon the advantage of housing Diesel-engine plant without annoyance in the neighbourhood. With well-balanced six-cylinder engines there was no need to fear vibration troubles and, as at Shrewsbury, it was possible to have the power station right alongside public buildings and residences. With previous speakers, he emphasised the advantage of the use of Diesel engines for peak loads, and suggested that the combination of Diesel engines and a partial bulk supply would show a considerable saving.

Mr. BERTRAM KELLY (Douglas, I.O.M.) said that in his power station last year four heavy-oil engines generated 2¼ million kWh at a cost for fuel, oil and water, &c., of 0.39d. per kWh generated. The fuel consumption was 0.92 lb. of furnace oil per kWh generated, at 75s. per ton, and the cost worked out at 0.287d. per kWh generated, which was as good as the very best example quoted in the paper. The Electricity Commissioners and the Central Electricity Board had no jurisdiction in the Isle of Man, but very shortly his station would develop into a capital station in a small way for supplying the whole of the island, an area of about 200 square miles. There would have to be from one to three, or even four, sets of 4,000 kW capacity and, although it was contemplated to put down a steam station, he intended to use Diesel engines in conjunction with the steam plant.

Mr. H. L. HOWARD (Macclesfield Electricity Supply Co.) expressed the view that steam engineers had been trying for many years to catch up the oil engine in the matter of thermal efficiency, and added that they had a long way to go yet. Mr. Gercke had mentioned tar-oil fuel, but many years ago he had had occasion to go very closely into the question of tar oil. In Germany the tar-oil industry was highly developed, and there was a surplus of tar there because they had not the quality of roads there that we had in this country. Here there was no surplus of tar sufficient to warrant the large gas undertakings putting down plant for proper distillation. He had been told by one of the leading London gas companies that it could sell all its tar for road purposes and make a good profit without treating it for the purpose of oil production. He had a large number of Diesel engines, some of them 15 years old, but they were all doing consistently good service, day in and day out, and were as efficient as the day they were put in. The secret was careful and efficient maintenance.

Mr. G. Porter promised to reply later owing to lack of time at the meeting.

Standardisation of Methods of Charge—Some Thoughts and Considerations.

By E. J. JENNINGS, F.C.I.S., Assoc.I.E.E., Secretary, Birmingham Electricity Undertaking.

(*Abstract.*)

A wide diversity of rates, the chief of which are enumerated below, exists throughout the country:

Flate Rate Systems.

(1) Flat rate per unit irrespective of consumption.
(2) Flat rates per unit on sliding scale, according to consumption.
(3) Flat rate, subject to increasing discounts dependent on consumption, also subject to further discounts for load factor and power factor.

Two-Rate Systems.

(4) Flat rate per kilowatt of "registered" maximum demand, plus a secondary charge per unit.
(5) Flat rate per kilowatt of "agreed" maximum demand, plus a secondary charge per unit.
(6) Two-rate charge per unit, varying according to the period of time during which energy is consumed.
(7) For power and heating.—Minimum consumption per quarter per horse power of demand at fixed rate per unit, with excess at secondary rate and sliding scale of discounts.

Two-part Tariffs.

Two-part tariffs, consisting of an annual fixed charge, plus a running charge per unit. Method of calculating fixed charge varying as follows:—

(8) Percentage on ratable value.
(9) On number of rooms.
(10) On floor area.
(11) On hours' use of maximum demand.
(12) On allocated or assessed number of units.
(13) Per lampholder.
(14) On wattage of lamps installed.
(15) On adequate lighting wattage, assessed.
(16) On average lighting consumption for three years, plus x per cent. New connections assessed.
(17) On "active" lighting wattage.

Miscellaneous.

(18) Service charge per quarter, irrespective of number of rooms, plus varying rates per unit under varying conditions.
(19) Fixed charge per wattage of lamps installed irrespective of consumption.
(20) Fixed charge per first kilowatt of lamps installed and lower charge for each additional kW, plus rate per unit.

The desirability of evolving some sort of order for the foregoing state of affairs is apparent, and the fact that within the course of the next few years practically all electricity

undertakers will cease to be generating authorities and will become purchasers of electricity in bulk from the Central Electricity Board on the basis of a two-part tariff, makes the necessity for undertakers to overhaul the tariffs on which they are retailing the energy still more apparent.

The author was privileged at one time to serve under that veteran tariff builder, Mr. Arthur Wright (first president of the I.M.E.A.), and calls to mind his apt observation to his committee to the effect that the designing of a "scientific" tariff was as difficult and as much a matter for experts as designing a complicated switchboard.

There has been rather too much tendency in some quarters to found tariffs on "scientific" principles, but there is no such thing as "exactitude" in general commercial practice, in the sense that there must be in engineering practice.

No doubt a manufacturer always aims at making a profit on each of his products. The measure of that profit is determined by market conditions, competition, and so forth, but there is such a thing in commerce as "losing on the swings to gain on the roundabouts"; in other words, prices are adjusted according to the character of the demand for his product and the whole of the circumstances in relation thereto.

The late Dr. John Hopkinson, F.R.S., laid down in his Presidential Address to the Junior Engineering Society, November 4th, 1892, the first principles of tariff-making. Briefly, the Hopkinson theory is that the cost of electricity supply depends mainly on the rate at which it is taken rather than on the quantity of energy supplied. The costs are of two distinct categories, *viz.*: (1) those that do not depend on the number of hours of supply, and (2) those that are directly proportional to the hours of supply.

Mr. Arthur Wright was the first to attempt to translate this theory into practice with his maximum-demand system.

The actual time of supply may be of more import than the number of hours of supply. For instance, a consumer with a load factor of 30 per cent., if taking supply wholly during off-peak hours, will be cheaper to supply, relatively, than one with a 100 per cent. l.f. whose demand must of necessity cover the peak load.

Water heating during the night provides an example of this principle, and any margin in price that can be obtained over the actual cost (say 0.25d. per unit) of the extra fuel, &c., required to meet this type of demand will all be profit for the undertaking. In spite of this, how difficult it is sometimes to persuade the powers-that-be that a rate of 0.375d. or even 0.5d. for this type of "valley" supply is good business.

There are wide differences of opinion as to diversity values, but the following appear to be approximately correct on the average:—

Domestic lighting	1.5
Commercial lighting	1.2
Power	2.0
Cooking and heating	8.0

The major portion of the total costs per unit of output is definitely of the order of "fixed" charges; that is to say, all this expenditure must be incurred in preparing to supply before a single unit is sent out from the works. Once this class of expenditure is provided for, any additional cost per unit of output is comparatively small.

Perhaps this can best be illustrated by taking two extreme cases, *viz.*:—

Consumer A demands 10 kW for 1 hour each day per annum.
Consumer B demands 1 kW for 10 hours each day per annum

Assume

(1) Total capital cost at £50 per kW and loan service charges at 8 per cent. per annum.
(2) Fixed costs (other than loan service charges) at £2 per kW per annum.
(3) Running costs at 0.25d. per unit.

The number of units demanded per day in both cases is identical, but the total cost in the first case is more than six times the cost in the second case. If the respective prices charged are 4½d. and 1½d. per unit, in the first case (that of lighting) the profit amounts to £4 12s. 9d., whereas in the second case (power), in spite of the price being less than one-third of that of the former, the profit is practically double.

These figures show that the low-priced supply is contributing to results, not only relatively, but actually far more than the high-priced supply.

The cost components of the order of "fixed" or "standing" charges are:—

(i) Capital charges as a whole (interest and sinking fund, &c.).
(ii) 15 per cent. of the cost of fuel, oil, water, &c. (required in order to be "ready to supply").
(iii) 90 per cent. of wages and salaries at stations.
(iv) 80 per cent. of repairs and maintenance costs (generation and distribution).
(v) Rates, taxes and rents as a whole.
(vi) Management and miscellaneous expenses as a whole,

leaving as "running" charges:—

(i) 85 per cent. of the cost of fuel, oil, water, &c.
(ii) 10 per cent. of wages and salaries at stations.
(iii) 20 per cent. of repairs and maintenance costs (generation and distribution).

Figures relating to the Birmingham undertaking for the year 1927-28 analysed on the above basis are compared with corresponding particulars for six of the largest municipal undertakings for the same year.

"Fixed" Costs.	Per cent. of Total Costs. Aggregate of six large undertakings.	Birmingham undertaking.
(1) Capital charges (whole) ...	39.83	41.26
(2) Fuel, oil, water, &c. (15 per cent.)	2.97	3.08
(3) Wages and salaries at stations (90 per cent.) ...	4.34	4.23
(4) Repairs and maintenance, G. & D. (80 per cent.) ...	13.41	14.25
(5) Rates, taxes and rents (whole)	12.49	10.35
(6) Management and miscellaneous (whole)	6.31	5.37
Total "Fixed" Costs ...	79.35	78.54
"Running" Costs.		
(1) Fuel, oil, water, &c. (85 per cent.)	16.81	17.43
(2) Wages and salaries at stations (10 per cent.) ...	0.48	0.47
(3) Repairs and maintenance, G. & D. (20 per cent.) ...	3.36	3.56
Total "Running" Costs ...	20.65	21.46
	100.00	100.00
Fixed costs per annum per kW of max. demand ...	£8.077	£7.765
Running costs, per unit sold	0.220d.	0.246d.

It must be conceded that both legally and in equity charges *should be related* to costs to a large extent. In any case the true import of costs as defined between those of a "*fixed*" and "*running*" order, respectively, must be understood clearly by all concerned with the framing of tariffs. But slavish adherence in the framing of tariffs to a "scientific" analysis of costs may well be fatal to any real progress in the development of Undertakings.

In the past there has been far too much effort devoted to attempting to get each unit of output to make an equal percentage contribution to the standing charges and profit.

One must be prepared to take ordinary commercial risks if the business awaiting capture is to be secured. A temporary loss of revenue may follow the initiation of a forward policy, but the reward in the shape of increased turnover most assuredly follows in due season.

"Equity" has become something of a fetish. Electricity supply, apart from the element of service to the community, is a business proposition. It is a matter of buying raw materials and producing and selling commodities. Some of the "leaven of commercialism" must be used in with the other ingredients if a "cheap and abundant" supply is to be attained.

It is a sound commercial axiom to find out what you can get for your product and get it, even if it shows a much larger margin of profit than you would expect to get on the average. It will then be possible to sell some other product at a price below that normally aimed out, showing only a small margin of profit, and one will more than balance the other.

This commercial doctrine of "expediency" should be put into practice by Electric Supply Undertakings, subject, of course, to the legal limitations imposed upon them.

The legal limitations are first of all that under the 1882 Act it is laid down that where supply is given in any part of an area every consumer is entitled to a corresponding supply under similar circumstances on the same terms as other consumers in that part of the area. Secondly, that in making agreements undue preference may not be given to any consumer.

The question of "undue preference" has been the subject of much discussion and of litigation on a few occasions. Case law has made it clear that the reason for different charges must be different costs, and that differentiation is justified in relation to cost. In the course of his judgment in the case of the Attorney-General v. Long Eaton Urban District Council, Mr. Justice Sargent said: "It would seem that A. must not be charged less than B. merely to overcome a greater reluctance on the part of A. to become a customer, or to induce A. to become a customer in respect of another supply, although either of those reasons might be a good commercial reason for charging less to A. were the public Undertakers merely carrying on any ordinary commercial business."

Then it is provided that maximum prices per unit specified in each Order may not be exceeded. These maxima are, generally speaking, well on the high side having regard to present-day conditions.

So much for the principal Act. Turning now to the Electric Lighting Clauses Act, 1899, it is laid down that the charges to any ordinary consumer may be (*a*) by the amount of energy supplied, (*b*) by the electrical quantity contained in such supply, or (*c*) by any other method approved by the Minister. Under the 1899 Act, a consumer who did not like any approved method under (*c*) had the option of electing to be charged under either (*a*) or (*b*), but this option was removed by Section 22 of the Electricity (Supply) Act, 1922.

It is thus now competent for Undertakers, provided they can satisfy the Minister of Transport as to the reasonableness and

equity of the method of charge proposed to be adopted, to get the Minister's sanction to a compulsory multi-part tariff under (*c*) above. It has to be recorded, however, that no such tariff has yet received official sanction, and thus all existing two-part tariffs are the subject of agreement with consumers, and are not statutory or mandatory in their character.

Electrical energy is only of value as an agent for some definite service, such as lighting, heating, power, cooking, &c. The price obtained should bear *some* relation to actual costs, but not necessarily the same relation to cost in each case, for it must also undoubtedly have regard to the cost of any competitive service. Points to be emphasised here are (1) that electricity supply has not an absolute monopoly in respect of any service it renders, and (2) that the law of supply and demand governs the business to a large extent.

If a large class of supply can be obtained at any margin above running costs, provided it does not call for further capital expenditure, then it is economic and wise to take it on. Prices and costs react on each other, and any contribution to standing charges shown by the margin referred to is all to the good so far as the general body of consumers is concerned.

Further, the small lighting consumers, if the rule referred to of exacting the same percentage of standing costs and profit were rigidly applied, would have to be charged considerably more than their present prices.

While price does not need to be too closely related to actual cost, electricity for water heating calls for what may be termed "cut" prices, for commercial reasons. Its contribution per unit to standing costs can only be very small, but, in view of the potentialities of this demand and its influence in filling up the dips in the load curve, it will make a very valuable contribution in aggregate to those costs.

The great majority of consumers require an electricity service in the first instance for lighting purposes. It is the primary requirement of the consumer, and at the same time is the least desirable type of demand from the supplier's point of view. From its natural characteristics, it inevitably creates a peak over all other types of demand for very short periods of the twenty-four hours; it is seasonal in its incidence and gives in itself the poorest possible load factor. Thus in every way it is the most expensive section of an undertaking's business, and in equity should be made to carry as much of the standing costs as it will stand.

The practice obtaining in some towns of so arranging prices and tariffs as to provide substantial surpluses for rate funds is much to be deprecated.

A deliberate policy of charging more than would otherwise be necessary, in order that the ratepayers' pockets, quâ ratepayers, may be relieved, is contrary to the spirit of the Acts under which it was made possible for public authorities to become authorised undertakers.

It has become too easy to appropriate trading funds that should have gone to (*a*) improvement of the service, (*b*) reserve, or (*c*) reductions of charge, so as to make rate fund requirements balance.

It is well therefore that the Electricity (Supply) Act, 1926, definitely puts a veto on any contributions to rate funds after March, 1930, unless and until there is a sufficient reserve fund accumulated to establish a reasonably secure position, and then only within clearly defined limits.

All the available evidence on the subject seems to indicate that in any scheme of standardisation the ultimate general adoption of a two-part tariff is desirable.

A scale of flat rates, which attempted to cover the whole of the business and at the same time to be equitable in its incidence, would need to be of such a comprehensive character as to be both bewildering to the potential consumer and difficult and expensive of operation.

The general adoption of a two-part tariff has already been advocated by the strong Advisory Committee on General Supplies of Electricity and Methods of Charge, appointed by the Electricity Commissioners in 1925 and presided over by Mr. J. W. Beauchamp.

The undertaking with which the author is connected has adopted a mixture of (*b*) ratable value and (*d*) floor area, coupled with actual lighting consumption (if consumer already on books) over a period of two or three years. Regard is had to all three factors in assessing the domestic consumer's fixed charge; in other words, an "electrical" assessment is quoted, and the consumer is not told that it bears any fixed relation to the ratable value of the premises, though it rests mainly on this. This amounts to the "weighting" of the ratable value in an attempt to get rid of the inequalities of a hard and fast percentage of ratable value.

Whilst a "mixed" basis for assessing the fixed charge, such as has been adopted in Birmingham and elsewhere, cannot, in the opinion of the Advisory Committee, become mandatory, and can only be by agreement with the consumer, the experience gained in operating it may provide data on which to base a sliding scale percentage on ratable value that will satisfy the requirements for a statutory method of charge under Section 22 of the 1922 Act.

The author feels that a blend of ratable value and area as a basis, so far as domestic supplies are concerned, presents so many advantages over others that it provides the most likely solution of the problem.

It is wise to divide the annual fixed charge over the four quarters of the year as far as possible proportionately to normal lighting requirements—say, one-sixth for each summer quarter and one-third for each winter quarter—so as to avoid the consumer's natural objection to paying too heavily in summer. These charges should be collected in advance; this will (1) lessen the possibility of bad debts, and (2) provide a substantial amount of working capital.

It is of interest to point out in this connection that our friends of the gas industry, having operated on flat rates of charge for more than three-quarters of a century, are now seeking power to introduce two-part tariffs.

The conclusions reached as the result of a general survey of the incidence of costs, experience of progressive undertakings, and the evolution anticipated under the 1926 Act are therefore:—

(1) Standardisation of methods of charge is desirable in the larger interests of the industry,

(*a*) because in future practically all electricity supply undertakers will themselves be purchasing bulk supplies on a "common" basis, even though rates themselves may differ owing to differing conditions;

(*b*) because it will avoid confusing consumers who move from one area to another if a system of charge is universal throughout the country, as in the case of the telephone service.

(2) Equity and experience alike call for the general adoption of a two-part tariff with possibly two-rate meters in certain cases. Any tariff adopted must be sufficiently elastic to permit and encourage freely a policy of filling in the "valleys" in the demand curve.

(3) With regard to the basis for assessing the primary charge to cover standing costs, no universal standard, capable of meeting all requirements, has yet been evolved, but, as nearly as may be, this should be related to the size of the building and the character of its use (*e.g.*, domestic or commercial), and in the case of industrial supplies it should be on the actual maximum demand.

(4) In any tariff or method of charge adopted every unit or output should bear some contribution, but not necessarily the same percentage contribution, towards fixed or standing costs.

(5) The difficulty of dealing with large undertakings developed on the basis of graduated flat rates should be met by the offer of alternative attractive tariffs of a two-part character, and a process of gradual change-over. Consumers should be given the option for a limited period of either two-part tariff or flat-rate system, and reductions of charges should in future be confined to the two-part-tariff rates.

Discussion of Mr. Jennings's Paper.

Mr. C. G. MORLEY NEW (borough electrical engineer, Cardiff) remarked that, although the author did not specifically say so, the greater part of his paper seemed to be directed towards tariffs for domestic supplies. Whilst he personally was in agreement that standardisation of methods of charging was desirable in the larger interests of the industry, he considered the first reason set out by the author why standardisation was necessary, *viz.*, that so much bulk supply would be given, was somewhat weak. He could not see why purchasing in bulk on a two-part tariff should necessitate drastic alterations in the tariffs upon which business had already been built up. As to the ratable value blended with floor area and previous consumption, as adopted in Birmingham, it seemed that the tariff depended very largely upon whether a consumer had, or had not, been supplied previously. The proposal seemed to complicate rather than simplify the tariff, and what was wanted more than anything else was simplification of tariffs. In his opinion the new rating Act had simplified the matter considerably and should assist in enabling a tariff to be devised on that basis, although there still might be anomalies, such as similar houses being assessed differently for various reasons. Some regard, however, must be had for the circumstances of the house and the amentities it enjoyed, because although of equal size some semi-detached and detached houses involved more costs by way of standing charges owing to their being a long way back from the street front, and for other reasons. He suggested that they should aim at a clear-cut ratable-value system, otherwise they might take into account the size of the family and the habits of the occupants of the house. The adoption of such a system as that suggested in the paper would mean that the prospective consumer would be totally ignorant of what electricity was likely to cost him until he made a personal application to the Department for information.

Mr. ARTHUR WRIGHT said the paper was such a complete and fair exposition of the Hopkinson method that there was very little to add to it. A most important point was to get the lay members of the Association to study the Hopkinson principles as laid down in his original paper. Most of the trouble in the electricity supply industry had been due to wrong nomenclature. They had been accustomed, for instance, to speak of electricity as a commodity, whereas it was a service, and they were entitled to charge a rental for that service as well as the cost of using it; if their tariff manufacturers had had less to say about load factor, peak load, &c., and had considered the matter solely on the lines Hopkinson had laid down, from the point of view of a service, it would have been very much simpler. That was the basis of standardisation in this matter. There were just three terms which could

be adjusted to the local peculiarities of local costs. What could be simpler and a fairer basis than a rental charge, a user charge, and a commercial discount? Hopkinson had said that that was all they required, which was true. The danger of trying to meet a popular cry was very serious; the popular cry was for some average charge, but that was really fatal to further development, and he was convinced that it was only by following Hopkinson closely that the great mass of the public could be induced to use electricity. At present in this country not more than 20 per cent. of the houses used electricity, and of that quantity not 20 per cent. were using electricity to the full extent. Thus the field available was enormous. He had been working in countries where 90 per cent. of the houses were electrified, and in some countries in Europe there was universal adoption of electricity. The city of Amsterdam was a wonderful case of a municipality applying the Hopkinson principles thoroughly and getting the mass of the people to use electricity. In America about 80 per cent. of the houses were electrified, but in this country, owing to the disease of tariffs, which was perfectly horrible in certain towns where there was almost a tariff for every consumer, things were very backward. There must be standardisation, and he submitted that Hopkinson had shown how to get on with standardisation. The duty of every municipality and company was to give a general supply on equitable terms to as many people as possible; he mentioned the companies because there were companies which seemed to think that their sole function was to look after their shareholders, and they were quite content to go along with, say, an 8 per cent. return on their capital and supply quite a small percentage of the inhabitants. What was wanted, however, was universal supply at the lowest possible price for the crowd, and that could only be possible by means of tariffs devised on the principles laid down by Hopkinson so many years ago. He regarded it as quite wrong, in principle, to make up on the swings what was lost on the roundabouts. When buying from the Electricity Board undertakings must be careful to see that the charge to them was not based on their average cost, or the average cost to the Board, but on the true Hopkinson division of the cost. It would be impossible for undertakings taking supplies in bulk from the Board to frame their tariffs until the Board's terms were known, and he had not yet been able to ascertain what were the terms they were likely to get. He therefore urged undertakings to take his advice and scrutinise the terms offered them to see that too high a charge was not made for use, and that a fair rental was charged. If the Hopkinson principle were followed it would be found that, once having started to give a supply, the cost of adding to the output was incredibly small; 1d. per kWh would bring in a good profit, and it was not difficult (although probably neither he nor anybody else who talked of ½d. per kWh would be believed) to sell electricity at well below 1d. per kWh. In order to give a cheap supply throughout the country, however, the charge for bulk supplies to authorised distributors would have to be very much lower than anything he had seen mentioned in any report yet.

Mr. JOHN CHRISTIE (Brighton) said that if they analysed tariffs they would be struck by the complication of the various systems of charging and the bewildering number of alternative tariffs offered by some authorities. Personally, however, he had always held that a simple, easily understood, tariff with flat rates for lighting and power, each at the lowest price it was possible to offer, was the best and most attractive in the long run. If a two-part tariff were to be substituted for an existing flat rate, it would be absolutely essential that the flat rate charged should be raised, so that all consumers at present using it would be compelled to adopt the alternative system; otherwise consumers would simply want to try each system and finally adopt the one which offered the greatest advantage. To base the fixed charge of a two-part tariff on a percentage of the ratable value, number of rooms, or floor area, wattage of lamps connected, &c., meant dealing with a somewhat indefinite factor in the assessment of the charge, which was far too great a responsibility to place in the hands of ordinary inspectors. The only fair way of operating a two-part tariff was the straight maximum-demand system. In the old days when that system was in force in Brighton, consumers used to compare notes, and at the end of the year, if a good consumer got a supply at a low price and boasted about it to his neighbours who did not use the supply in the same way, there were many complaints and the staff had to spend a great deal of time trying to explain what was to the lay mind a very difficult proposition. As the result, it was decided some 21 years ago to abandon the maximum-demand system and flat rates had been charged ever since with the greatest satisfaction to all concerned. The financial results at Brighton were the "proof of the pudding." The accession of new business due to the simple, low, and easily understood flat rates in Brighton had been phenomenal during the past year or two, and he contended that by such a system the consumer in Brighton was getting his supply at a lower rate than he would on any two-part tariff. It might be said that such a system involved duplicate wiring, but in many cases the existing wiring would not permit of 3-kW radiators being installed all over a house, and it was therefore essential that a new system of wiring with suitable outlets should be provided. There might also be the disadvantage of an extra meter, but after all was that a very serious drawback? He would like to see meters supplied free of rental and, when possible, they should be purchased out of revenue. There was no question, continued Mr. Christie, that the maximum-demand system was the only system on which electricity could be purchased from the Central Electricity Board, and for charging consumers to whom it was retailed the same method should apply, charging an increased percentage to cover transformation and distribution losses, plus the margin of profit to which the undertaker was reasonably entitled. Nevertheless, for the large number of ordinary users he saw no reason for retailing on the maximum-demand system, and with carefully considered flat rates, with sliding scales for quantities, the whole thing would level out and provide a reasonable margin of profit.

Alderman W. WALKER (Manchester) said that a number of the systems of charging described in the paper were merely variations of each other, and were quite unnecessary. He was whole-heartedly in favour of the ratable-value system, because any other method of assessment meant that some subordinate must decide, and there was bound to be dissatisfaction between various consumers who regarded themselves as being in similar circumstances. The ratable-value method would be accepted by everybody, because consumers were rated in that way for other purposes, and clearly understood what it meant. The author, having spoken of the need for simplicity in the paper, went on to describe the method adopted in Birmingham, which was a combination of ratable value, floor area, and the actual lighting consumption over a period of two or three years in the case of an existing consumer. That did not seem to conduce to simplicity, and there was, in addition, the nigger that the method could not be applied to new consumers, because they had not any previous consumption, so that their assessment must be based upon some other method. Again, taking the Birmingham method, in the case of a new tenant, was he to be assessed on exactly the same basis as the previous one, notwithstanding that the habits of the new family might be totally different from those of the previous family? Looked at from all points of view, it seemed to him that the ratable-value system was the best. On the other hand, in the case of large, and sometimes special, industrial loads, it was necessary to make variations in the tariff to suit the particular conditions if the business was to be secured. For instance, electro-chemical works next door to the power station taking power at times convenient to the electricity undertaking direct from the station bus-bars and metered on the high-voltage side could not be expected to pay a proportion of the general distribution charges. One danger in connection with the industry was the introduction of politics with regard to supplies to Council estates. Very often candidates for local election promised reductions in charges for electricity as an inducement for ratepayers to vote. That was grossly immoral, and if undertakings were compelled to saddle themselves with losses on such supply and it became known to large industrial users it would be a serious thing, because they would naturally object to bearing those losses.

Dr. S. Z. DE FERRANTI, speaking as president of the Electrical Development Association, said the general public did not understand charging for electricity, and therefore tariffs must be arranged in such a way as to appeal to the general public. In the present stage of development there was no option but to charge on the basis of a two-part tariff. He did not think it very important how the two-part tariff was arrived at, but it must be high enough to cover the standing charges and enable the actual energy to be metered at the lowest possible rate. Only in that way would householders be encouraged to use a great deal of electricity in their houses for small power purposes, instead of confining its use to lighting, as was so often the case at present. The time had arrived when they must go for simplification as far as was possible. Again, the public did not understand, and was greatly troubled by, the variation of tariffs in various parts of the country. There was, of course, justification for different prices, but there was no justification for the immense differences that existed, and he was afraid that they were to a certain extent due to want of commercial efficiency in carrying on the business in certain cases. It was very unfortunate that that should be so, and it was up to the Association to do everything possible to remedy that state of affairs. Many undertakings gave a wonderful service to the community, and if the example set by such undertakings was taken as an ideal by the others it would be most advantageous for the whole industry and very beneficial to the public.

Mr. F. M. LONG (electrical engineer, Norwich), speaking of the criticism that was sometimes levelled at Electricity Committees for selling power at less than its average cost to the undertaking, said he had had occasion to go into that matter in Norwich, and found that, whereas the average cost for the whole undertaking was £10 per kW, plus ½d. per kWh, the cost for power supply was only £7; in the case of lighting it was £12. In Norwich, where there were 24,000 consumers, there were only 250 factories, which were fairly close together, so that the distribution costs were nothing like as heavy as in the case of the lighting consumers who were scattered over a wide area. It was apparent that power could be supplied very much more cheaply than lighting or domestic supplies, and it was also possible to devise a fair flat rate for such supply. For domestic purposes, naturally he did not think there could be anything simpler than the ratable-value system. With regard to heat storage and electricity used during the night, there must be a rate at least as low as ½d. per kWh, which was fully justified because there additional charges were not involved for generation or distribution. They could not go so low as that for cooking because, although some

engineers said it was off peak load and therefore did not matter, and it could be supplied at practically coal cost, that was not his opinion. His experience had been that very large sums of money had had to be spent on increasing the capacity of the distributing mains, and that amounted to something like ¼d. per kWh on the cooking consumption in order to meet the distribution charges, but that did not apply in the case of water heating at night time.

Mr. S. E. BRITTON (electrical engineer, Chester) said there were undoubtedly too many methods of charging, and the sooner they got down to the absolute minimum the better. There must be a two-part tariff, and the fundamental principles should be the highest possible standing charge and the lowest possible running charge. The ratable value under the 1925 Valuation and Rating Act was on a much fairer basis than had been the case previously, and was an advantage to electrical undertakings, because on the average the assessments had been increased under that Act, and it was a simple matter to get at the figures of the assessments for a very small cost. Mr. Britton, speaking to committee members, suggested the need for a little more courage in developing the rural areas around the large centres, the lack of which, he said, was not carrying out the trust which had been placed in electricity undertakings for the benefit of the public as a whole.

Mr. H. C. LAMB (engineer, Manchester) remarked that the consumer supplied on a two-part tariff quickly appreciated the advantage of it. He agreed whole-heartedly with the principles of equity laid down in the paper, and believed that profit must be obtained where it could be; nobody had attacked that part of the paper. Unless they proceeded on those lines, there would be no progress. It must be remembered that electricity undertakings had to fight against very severe competition, especially in the industrial field. Even many of the contractors who were present at the Convention as friends were serious competitors of public electricity supply in that they carried on extensive propaganda in the industrial field for the installation of private plant; unless public-supply authorities were prepared to counteract that propaganda and quote competitive rates they would make no progress at all. The weakest part of the paper was that relating to standardisation, because the author was unable to make any recommendations on that matter. The subject was an extremely difficult one, and he did not feel that the time had come yet for standardisation to take place. The argument for standardisation was that, although the progressive undertakings might have nothing to gain by it, it would speed up the backward undertakings; but the point was that the progressive undertakings with a variety of more or less complicated tariffs had secured the most business. No doubt in time, when conditions became more unified, it would be easier to introduce standard tariffs.

Mr. E. J. JENNINGS was unable to reply owing to lack of time, and a hearty vote of thanks was accorded him on the motion of Mr. FRANK HODGES.

Annual Dinner.

The annual dinner was held at the Pavilion on June 6th, the president, Mr. A. Nichols Moore, being in the chair.

After the loyal toasts had been honoured, Sir JOHN SNELL, G.B.E. (chairman of the Electricity Commission), proposed "The Incorporated Municipal Electrical Association," mentioning that, owing to pressure of public business and some regard for doctor's orders, he had been prevented from attending the Convention for more than one day. The president's address he had read carefully and, if he might say so without immodesty, a great deal of it might have been written by himself. For ten strenuous years the Electricity Commissioners had been trying to bring some orderly simplicity into the electrical industry, and economic generation was now adequately provided for. When it was remembered that the output of electricity, low as it had been, had doubled in the last five, or five and a half, years, and that the average rate of the increase of growth was one thousand million kWh per annum during the last two years, he had no reason to doubt that the large output of electricity which he had advised the Weir Committee in 1924 would probably be realised within 15 or 16 years was in a fair way of being realised, or even exceeded. If the industry could obtain, as it had done through the Electrical Association for Women, the sympathetic assistance of the ladies, then he believed that the growth of its use for domestic purposes would be of such a nature that the estimate made in 1924 would most likely prove to have been far too much on the conservative side. He agreed with the president that provision for the cheap production of electricity and its main transmission was only half the story, and whether it fell to himself, or to someone with fresher vigour, to head the Commission in the work which lay before it, there could be no doubt that the next task which would obviously fall to the Commissioners would be to co-ordinate the distribution of electricity throughout the country. He did not, however, wish to be misunderstood. For years past the Commissioners had been steadily encouraging (and had been greatly assisted by many of the distributors) the gradual standardisation of distribution systems and the gradual supplanting of d.c. by a.c. distribution, without which the increasing density of load in urban areas, for domestic purposes in particular, could never adequately be met. That quiet preparation was, in the aggregate, going to be quite a substantial contribution to the gradual simplification and improvement of distribution systems, and was quietly paving the way for the larger step yet to be taken. The point which must be borne in mind was that local Government areas, especially the smaller areas, were not necessarily the most economic, and probably did not have the most economic electrical boundaries. He need only point to the development which had taken place in Torquay, where electrical development had not been confined to the town; the Corporation had carried the benefits of electricity at cheap rates into the hinterland and districts surrounding the town. Many other towns were doing the same thing; there were, however, a great many which were not doing that, and to those he appealed and asked, in their own interests and in the general interests of electrical development and of the country, that they should carry electricity supply into the more rural districts, because only by that means could the amenities of life be increased and things made more workable for the poorer people. He was not talking nonsense; indeed, it was sober sense which had been proved in more than one district, and he believed there would have to be some association of municipal interests on the lines that had been adopted with such marked success, for example, by the Ayrshire Joint Board. Something of that kind would have to be done if they were to get the most efficient form of distribution and the most economic distribution in the rural areas.

Addressing himself particularly to the Committee members of the Association on the subject of research in the electrical industry, Sir John said that an income of £16,000 per annum was inadequate to carry out the research necessary in the interests of the electrical supply industry; the expenditure should be something of the order of from £25,000 to £30,000 per annum. Speaking from memory, he believed the contribution to the funds of the Electrical Research Association from the supply industry was about £3,000 a year only. That came from an industry from which local authorities and companies had an annual revenue of something like £50,000,000, and it was growing rapidly. What was wanted was a contribution of 1s. to the Research Association for every £100 of revenue earned. Surely that money could be forthcoming in order to support research work which already had had a most important economic effect upon supply conditions, and he asked Committees of Corporations which were authorised distributors to seriously consider that it was to their own advantage that the contribution of a reasonable amount, in some proportion to their revenues, should be made to the funds of the Research Association.

Mr. A. NICHOLS MOORE, President, in reply, thanked Sir John for the way in which he had proposed the toast. They all wished him a speedy return to that vigorous health which he had so long enjoyed. Undoubtedly the Association was making amazing progress. There were 1,020 delegates and visitors to the Convention this year, and the Association could be proud of the fact that it now had considerable influence and was playing an important part in the development of electricity supply in this country. There had been occasions when the Association had crossed swords with the Commissioners, and when they had sometimes come off worst in discussions with Sir John Snell's colleagues, who, nevertheless, were always open to reasonableness, even if on occasions those who discussed matters with them were kept waiting for decisions. The Association was "all out" with the Commissioners and the Central Electricity Board to make the new scheme a success, and he believed that would be done, but it was necessary to have the help and guidance of the Commissioners to take full advantage of the legislative machinery which Parliament and providence had placed at their disposal.

Alderman E. HUNTSMAN (chairman, Nottingham Electricity Committee) proposed "The County Borough of Newport and the Borough of Torquay," which toast was replied to by the Mayor of Newport (Councillor Walter T. Griffiths) and the Mayor of Torquay (Mr. Harry Geen).

The final toast of "Our Guests and the Ladies" was proposed by Mr. R. A. CHATTOCK (past President).

Mr. FRANK HODGES, in the course of his reply thereto, said that, although the members of the Central Electricity Board dealt with the problems they had to face in a strictly impartial manner, he foresaw the day when private enterprise in matters electrical would offer no more in scope, no more in ambition, and no more in salary than municipal work. He believed the I.M.E.A. membership would increase and the influence of the Association would increase, and he expressed the hope that under prudent and wise guidance the Association would grow.

Annual Meeting.

The annual general meeting was held on June 7th, in the Pavilion, and was, as usual, private.

The result of the election of officers and members of Council for 1929-30 was as follows:—

President: Mr. J. K. Brydges (borough electrical engineer, Eastbourne).

Vice-president: Mr. A. J. Fuller (borough electrical engineer, Fulham).

Hon. solicitor: Mr. J. H. Rothwell (Brighton).

Hon. treasurer: Mr. H. Faraday Proctor (Bristol).

Hon. secretary: Mr. A. C. Cramb (Croydon).

The following gentlemen were elected to fill vacancies on the Council:—*Large undertakings:* Major E. A. Barker

(Barnsley) and Mr. A. W. Barham (Watford). To fill the vacancy caused by the election of Mr. Fuller as vice-president, Mr. J. W. Burr (Swansea) was elected for one year. *Small undertakings:* Mr. C. J. Wood (Sale). *Local authority representatives:* Alderman E. Huntsman (Nottingham) and Alderman T. Shires (Huddersfield).

The Council's annual report and accounts were adopted.

The meeting closed with a cordial vote of thanks to the retiring president, who, in acknowledging it, spoke of the services of Mr. Cramb as hon. secretary and of the special difficulties which he had to face in organising the Convention this year. The fact that everything in connection with the Convention had passed off with comparative smoothness and had been carried out according to plan was due entirely to Mr. Cramb, and he proposed a hearty vote of thanks to him, which was carried with acclamation.

Mr. CRAMB, in acknowledgment, said it was always a pleasure to do anything he could for the Association. The development in the last ten years, however (during which time he had been hon. secretary), had been such as to render it impossible for him to give the amount of time to the affairs of the Association as he had done in the past. The Association was now getting so big that he sometimes felt a little bit afraid of the future, because it had reached such a position of importance that it was necessary to live up to it. His own duties to his Corporation were increasing rapidly, and the fact that he would not be able to give so much time to the affairs of the Association in the future as he had done in the past was a matter to which the Council would have to give careful consideration.

Cordial votes of thanks were also passed to the Mayors of Newport and Torquay, to the chairmen of the Electricity Committees of those towns, and to the officials of the Torquay Corporation in connection with the arrangements made for the Convention.

The I.M.E.A. Exhibition.

(*Concluded from page* 1084.)

MESSRS. GEORGE NOBBS, LTD., made a special display of automatic temperature controls for electric water heaters, ovens, refrigerators, and biological apparatus, as well as the new type "M.B.R." room-temperature control. The room-temperature controls are claimed to be particularly suitable for low-temperature convectors, heating panels, electric hot-water radiators, tubular heaters, and the like. For domestic purposes it is recommended that, where desired, the electric fire may be retained for the cheery aspect, and the automatic control provided for the non-luminous convectors, which

Fig. 10.—"M.B.R." Room-temperature Control.

should be generally situated at the cold parts of the room, *i.e.*, under the windows. For most average conditions it is recommended that 50 per cent. of the maximum heat required in the room be provided by a low-temperature form of heater, and the other 50 per cent. by an electric fire. The adjustable temperature dial of the "M.B.R." instrument is provided for normal conditions for 50-70 deg. These instruments are also made for garages or private lock-ups for preventing attack by frost. Fig. 10 shows the "M.B.R." instrument. The thermostat consists of a sensitive expanded-metal bellows, which operates upon a single-pole tilting mercury switch, and with the dial the whole is mounted in a mahogany box with a hinged glazed door. The standard sizes are from 6 to 20 A up to 250 volts a.c. or d.c., Larger sizes up to 50 A can be supplied, and also for pressures up to 500 volts. Type "M.B.R." room controls work within ± 1 to 2 deg. F. The mercury-tube switch is fitted with a ceramic liner, &c. Electric heater tubes with loadings of 25/70 watts per ft. run were also to be seen on this stand, while new models of hot-water calorifiers formed another feature. The latter are made in seven standard sizes from 5- to 50-gal. capacity, with loadings of from 500 to 3,000 watts, respectively; they are automatically controlled by a thermostatic switch. These

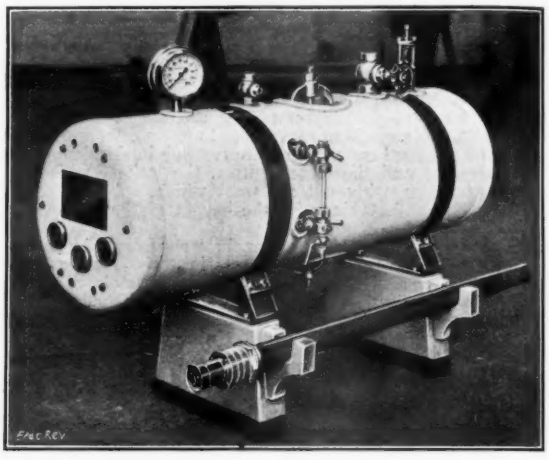


Fig. 11.—"Reyrolle" Steam Raiser.

N.S.G.-type calorifiers, as supplied for hard water, have an internal container divided into two parts, one part being the primary or heating chamber containing the thermostat and immersion heater. This primary chamber is divided from the upper chamber by an inclined deflector plate and a vertical heat-circulation channel, and gives out the heat to the secondary storage chamber by conduction of heat through this deflector plate and channel. As the water in the primary chamber is not changed, and the temperature difference between the primary and secondary storage chamber is small, there is, it is claimed, comparatively very little fur deposit.

REVO ELECTRIC CO., LTD., displayed a comprehensive range of "Revo" electric cookers in standard and "de luxe" finishes. These incorporate the following new features: circular boiling plates, spring-loaded drop doors to the hot-cupboards, improved door catches, improved and simplified switchboxes, and larger ovens. They also incorporate the makers' present standard vitreous-enamelled finish to all sheet-metal portions. The "superspeed" boiling plate, which was first introduced to the public at the Bath Convention last year, was again exhibited. A further item of interest on this stand was a small patented device whereby the low loading of any boiling plate may be reduced still further to meet various culinary needs. This apparatus takes the form of a small subsidiary resistance mounted in conjunction with a tumbler switch; it can be adapted to existing cookers. The remainder of the "Revo" exhibits comprised water heaters, automatic kettles, and a "de luxe" washboiler in mottled finish, together with a sample of the "Maisonette" cooker which is being supplied to the Leicester Corporation.

MESSRS. A. REYROLLE & CO., LTD., showed an electric steam raiser, fig. 11, for use where a small quantity of steam is required, and a domestic water heater. The steam raiser has a total capacity of 18 kW, and will raise steam, it is claimed, in 10 to 15 min., the pressure being 80 lb. per sq. in. The heating elements are built up of three 6-kW units, and the required selection is made by means of a standard Reyrolle earthed plug. Three sockets are provided, so arranged that either one, two, or three units are in circuit, giving 6, 12, or 18 kW, respectively. The fittings are nickel-plated and the whole equipment is attractively finished in white enamel. The domestic water-heater is equipped with a 500-watt heating element, which is controlled by means of a thermostatic switch. A representative collection of small metal-clad air-break switches for domestic and other purposes was also to be seen on this stand. All the switches are of the quick-make and -break pattern, and their covers are interlocked, so that it is impossible to open them when the switches are in the "on" position, or to close the switches when the covers are off. The domestic switches include a cooker control board with a red lens and an indicating lamp to show when the switch is on. The switches for industry are suitable for currents up to 60 amperes at pressures of 660 volts, and are weatherproof. A board was also exhibited showing a number of plugs and sockets that have been manufactured by this company to the British Standard Specification No. 196-1927. By kind permission of Messrs. Drury & Chaffe, Union Street, Torquay, Messrs. Reyrolle displayed in one

of their windows some heavier switchgear. A control panel for use with the makers' "centrovisory" control apparatus is capable of controlling six circuit breakers in a remote station, but panels can be manufactured for 12- or 24-way operation. By means of an ingenious and simple diagram on the panel and indication is given of the conditions existing at the switching station, and the meters provided enable the load on each switch to be read and the pressure of the bus-bars to be ascertained.

A variety of apparatus which was to be seen on the stand of SADIA, LTD., included seven wall-type water heaters; a stand-type 66-gal. water heater; a section of a 4½-gal. water heater; a full range of "Sadia" self-winding time switches; a new

Fig. 12.—"Xcel Minor" Cooker.

universal mercury thermostat; full ranges of boiling plates, aluminium utensils, and enamelled table stoves; motor-driven thermostatic controls; and a drying stand. It is claimed that the aluminium cooking utensils, which have been especially designed for electric cooking, result in current saving and increase of speed by about 20 per cent.

The principal items shown by SANTON, LTD., included the "Santon" circulator, geyser, and electric tank belt. The circulator is intended for use with any existing hot-water system, and consists of a double-shell copper tube carrying element tubes down the centre. The double shell forms an air lagging between the hot water rising through the tube and the cold water in the tank. The apparatus is available in two sizes with overall dimensions of 25 in. by 3¼ in. and 31 in. by 3¼ in., respectively, having a loading of 3 kW in each case. The belt is obtainable with loadings up to 1,500 kW, and the geyser with loadings up to 8 kW single-phase, or 12 kW three-phase.

The exhibits of SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., included standard "Xcel" cookers of various types fitted with "Xcel" totally-enclosed boiling plates. A special feature was a display of "Imperial"-type cookers as supplied to Colonial undertakings. There was also a representative range of "Cosyglo" fires embodying moving-flame and smoke effects, and fitted with an improved rotor. The remainder of the exhibits consisted of "Xcel" safety kettles, together with a large model showing the operation of the cut-out arrangement to prevent element burn-outs; a range of "Xcel" immersion heaters; "Xcel" tube heaters, with a sample of the special high-voltage tube heater as used for tramcar heating; "Xcel" tower rails; and the new "Xcel Minor" cooker, fig. 12, which was on show for the first time. This has a small oven with a new design of dual grill boiling plate. It can be supplied for table use, or with a stand to form a complete cooker.

There was a particularly attractive and interesting display by the Torquay Electricity Department, showing the various types of apparatus let out on hire by the Department, and literature concerning prices, hire rates, and so on.

Messrs. J. H. TUCKER & CO., LTD., had displayed a complete range of control units for electric cookers, water heaters, and the like. These units are all self-contained, and provide for a pilot light, either enclosed in the case itself or showing through a bull's-eye lens, or for a lamp projecting through the lid which, in the case of consumers on a flat rate, can be used as a lighting medium, or for taking off any small apparatus such as toasters. A sub-circuit is provided in the form of a socket point, and is suitably protected by fuses inside the case. In one model this sub-circuit is controlled by an independent tumbler switch. Another model of the cooker control unit is of the open type and specially designed for use with "baby" cookers, embodying all the essentials for efficient control at an attractive price. Included in the appliances for the control of portable heating appliances was a new 15-A d.p. interlocked, foolproof and shockproof switchplug. There are two breaks on each pole of this switch, which are operated simultaneously by the withdrawal of the plug. The withdrawal of the plug not only renders itself dead, but actually disconnects the socket entirely from the source of supply. The withdrawing movement rotates shields of bakelite, which form barriers over the slots into which the plug pins engage with the socket. Other "Tucker" exhibits included insulated lampholders; complete ranges of all types of sockets and plugs to B.E.S.A. specifications; an extensive range of tumbler switches in insulated "Telacite," in white, brown and black; sunk switches with plain or ornamental metal plates; metal-clad lampholders and switch lampholders; and ironclad switch and fuse gear generally. A new product of interest was an ironclad fuseboard consisting of totally-enclosed units made to comply with the test requirements of the I.E.E. and the relative B.E.S.A. specification, and mounted on rustproof detachable battens. The case is fitted top and bottom with malleable detachable ends which can be removed for drilling, even after the board has been erected.

VENNER TIME SWITCHES, LTD., displayed a wide range of time switches for the control of street lighting, electric water heating, and so on. Stop watches, reading to 1/10th of a second, were also a feature, while another exhibit was the new "Venner" thermostat, fig. 16, an improved model easily convertible for use either in horizontal or vertical positions. New models of time switches for poultry farms were also on show. The new solar dial-controlled electrically-wound time switch, as used by the G.P.O. authorities in telephone kiosks, was another interesting exhibit, as was a new type of domestic water-heating control switch giving three "on" and three "off" operations per day. A further item on this stand was a 5-A, 15-day time switch, with selective devices, for controlling earlier-hour and/or Sunday operation.

On the stand of Messrs. YOUNG, OSMOND & YOUNG, LTD., there was an interesting display of "Unity" tubular electric heaters for the heating of schools, churches, offices, &c. Other "Unity" exhibits included a thermostat for constant-temperature control, fig. 15; towel airers for floor or wall mounting; a car-radiator heater for an easy start and protection from frost; a linen-cupboard heater; a 4-bar radiator, with or without 3-heat control; a gas-tight and water-tight heater for petrol depôts; window heaters; and a heater for traction work, available for pressures up to 1,500 volts.

Messrs. BULPITT & SONS, LTD., showed examples of their electric kettles, incorporating some interesting innovations. The latest "Bulpitt" safety device provides for the throwing off of the connector as the result of the softening of a low-melting alloy. When the kettle has cooled down it is only necessary to push on the connector again, and this action resets the safety device, and the kettle is ready again.

A range of immersion heaters for fixing into hot-water tanks is shown for the first time, and a 15-gal. thermal-storage tank is shown fitted with an external thermostat. An efficiency of 96 per cent. is claimed for the immersion elements.

Features of the exhibits by the EDISON SWAN ELECTRIC CO., LTD., were the new wiring systems recently introduced by the company. One is an unearthed system with bakelite junction boxes, and the other an earthed system with the boxes in metal. Figs. 13 and 14 show the bakelite and metal

Fig. 13.—"Ediswan" Bakelite Junction Box.

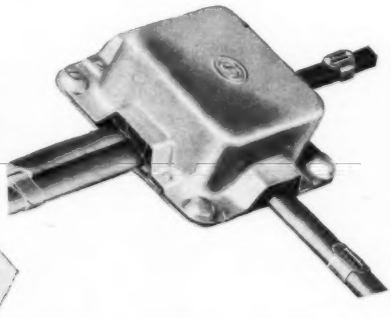


Fig. 14.—Junction Box for "Ediswan" Earthed System.

Fig. 15.—The "Unity" Thermostat.

junction boxes, respectively. The former is attractively designed and finished. The base of the box is quite flat, no chipping or filing is necessary, and there are no loose fillets, loose connectors or unused ways. Connection pillars are cross drilled for easy wiring, and the cord-grip is in one piece. All surface entries are provided with extensions to shroud the ends of the wood channel, thus rendering the box dustproof. Future extension is simple. There is a blanked hole in the base for back entry. The "Ediswan Magnolia" channelling for use with this system is neat, but plain. It is suitable for either clip or screw fixing, the fixing clips fitting internally.

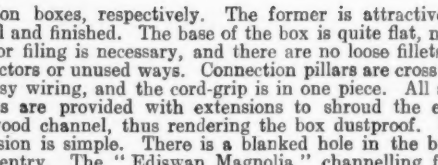


Fig. 16.—The "Venner" Thermostat.

The "Ediswan" junction box used with the earthed system is very simple to fix. The box is stamped from mild-steel, tinned or copper-plated, with a black-bronze finish. The complete box contains only two short screws. The bond is completely automatic and allows for cables of varying diameters. The box will take two twin cables (3/.036) at each entry; back entries are provided. The unused ways are closed. The box can be supplied with a ceiling-rose box cover with a cord-grip. Indented buckle clips provide a rigid base for the cable. Other "Ediswan" exhibits included stationary batteries and "Thor" washing machines and ironing and cleaning appliances.

On the stand of the British Thomson-Houston Co., Ltd., were shown some of the company's latest developments in lighting fittings and equipment, including the new "Hermetica" lantern with double well glass, suitable for industrial use where it is essential to employ a gas-tight and water-tight unit, the "Glassteel" diffuser for higher-class general industrial lighting, and the gas-tight dispersive reflector fitting with guard. Another feature was the B.T.-H. quick detachable ceiling and wall plates with which many municipal and other electrical showrooms have been installed owing to the facility they give for rapid change of display. Also shown was a patented screwless canopy which simplifies the cleaning and re-lamping of fittings employing totally enclosing glassware. In the floodlighting section were shown the B.T.-H. 599 projector in its latest form, and the new spherical projector lantern as installed throughout the North-East Coast Exhibition. Examples of the "Luxor" dining-room pendant and "Eye Restolite" floor standard were also on view. Other lighting equipment shown included street-lighting fittings, such as the "Zona" and the "Rugby" and "Manchester" pole-top units. The "Tungar" rectifiers exhibited proved to be of great interest, particularly the new type 75-V, 6-A model which is shortly to be placed on the market. The overall dimensions of this machine have been reduced, and a new and improved type of main switch and rheostat and new replaceable fuse units have been fitted. Another new type exhibited was the high- and low-tension model. This has been designed especially for the home radio user. By its use both the high- and low-tension batteries of a wireless set can be kept in a thoroughly charged condition with the least possible trouble. On the d.c. side the output is, for low-tension batteries, 0.8 A on 2, 4 or 6 V, and for high-tension batteries 0.1 A at 60, 90 and 120 V. A notable feature in this "Tungar" is the plugging system, whereby the d.c. leads cannot be reversed. Another exhibit which attracted much attention was the B.T.-H. electric refrigerator.

Reviews.

Electric Heating. By Edgar A. Wilcox, B.Sc. Pp. viii+469; figs. 152. London: McGraw-Hill Publishing Co., Ltd. Price 25s. net.

This work is so comprehensive that its title does not convey anything like the fullness of its contents. It is most exhaustive, and deals with everything pertaining to electric heating, from simple domestic appliances to the largest high-powered furnaces of the nicrome ribbon type, the silica-Carbide type, the granulated carbon type, the graphite plate type, and also arc furnaces for steel and metal smelting, while furnaces for the reduction of iron ores, &c., manufacture of calcium carbide, fixation of nitrogen, and other electrochemical processes are all dealt with in a clear, concise and masterful manner. Chapter XV deals with arc-welding in all its phases, and in such a complete manner that we have frequently seen books devoted to this subject which do not contain as much information on the subject as this chapter alone. It is thoroughly up-to-date, and includes a chapter on high-frequency furnaces of the Ajax Northrupp type and the latest thing in welding, *i.e.*, the atomic hydrogen system as developed by the Internation General Electric Co., Schenectady, N.Y., is fully described.

The work is suitable as a text-book for students or as a handbook for practical furnace designers and builders, who will find the numerous tables and formulæ, based on practical experience, of the greatest help. We can confidently recommend it to our readers.

A.V.C.

Induction Motor Practice. By A. M. Dudley, B.S. in E.E. Pp. xi+236; illustrated. London: McGraw-Hill Publishing Co., Ltd. Price 12s. 6d. net.

This is essentially a practical book, and is intended to supplement an earlier volume by the author under the title "Connecting Induction Motors," which dealt principally with windings. The present book is intended to bring the author's experience to operating men, students, and those who have to supervise the running and maintenance of induction motors. These machines can present many intricate problems, as can easily be seen from an inspection of the chapter headed "The Question Box." The material for this has been drawn from the pages of the Westinghouse Company's "Electric Journal," in which the author, who is engineering supervisor of development in that company, has for several years contributed answers to questions sent in by readers. "The Question Box" occupies nearly one-half of the present book, and many of the problems dealt with are of interest. No attempt, however, is made to classify the type of problem, only a chronological order being observed. Much might be gained by a proper arrangement of these questions and answers over and above that supplied by the index. The author's practical knowledge can be accepted as authoritative; but the learner will probably prefer some more orthodox type of text-book for studying the action and underlying theory of the induction motor. In this connection there is some lack of consistency, for while considerable space is allotted to explaining alternating currents and the meaning of power factor, peculiar and involved forms of circle diagram are taken almost for granted. Attempts to emasculate essential theory are usually foredoomed to failure; the same principles should be taught to artisan, foreman, manager, student or designer. The treatment may vary in elaboration, but in no case should it be scrappy. For practical matters, especially those concerned with changes made in an existing motor (*e.g.*, change of number of phases, frequency, air-gap, voltage, &c.) the book provides much valuable data, but it may have to be sought. The paragraph sub-headings rather suggest their journalistic origin. "Why Rotor Copper Loss Equals the Per Cent. Slip" is a typical example. Nevertheless, to the class of reader intended, the book should prove useful.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

Overhead Lines.

When an electricity supply company or corporation proposed to put up a steel-tower line in the past the Electricity Commissioners used to be satisfied with drawings of the steel towers, showing the sizes of the tower members, the foundations, and giving stress diagrams. They have now started calling for detailed calculations of the towers and foundations, in addition to the other information mentioned above. Seeing that they themselves can check the designs put forward, from the drawings supplied, one would think that the already long list of information and drawings required under Form El.C. 53 B. would have been sufficient without demanding to see the tower contractors' detailed calculations.

It is time a protest was made against this growing tyranny on the part of such bodies in calling for a lot of unreasonable details and information from contractors. It is just the same with a great many of the specifications issued nowadays by consulting engineers, who are continually asking for more and more unreasonable details to be furnished by every tenderer.

Protestant.

June 11th, 1929.

Tariff Standardisation and Water Heating.

May I draw attention to the following extracts from Mr. E. J. Jennings's I.M.E.A. paper :—

(*a*) "A wider outlook and a bolder policy was suggested as necessary."

(*b*) "We must be prepared to take ordinary commercial risks if the business awaiting capture is to be secured."

(*c*) "The commercial doctrine of expediency was recommended to be put into practice."

(*d*) "Electricity for water heating calls for cut prices for commercial reasons. Its contribution to standing costs can only be very small, but in view of the potentialities of this demand, and its influence in filling up the dips in the load curve, it makes a very valuable contribution in aggregate to those costs."

(*e*) "Equity and experience call for general adoption of a 2-part tariff with 2-rate meters in certain cases, and must encourage freely the policy of filling in the valleys."

In the discussion, Mr. F. M. Long, of Norwich, is reported as follows :—

"With regard to heat storage and current used during the night, there must be a rate at least as low as ¼d. per unit and that was fully justified because there were no additional charges involved for generation and distribution."

To my mind the above extracts form the crux of the whole question of tariff making. Here we have the considered opinion of two men of great experience, commercially and technically, and they both stress the importance of a suitable tariff for heat storage during night hours. "*It calls for cut prices,*" says Mr. Jennings; "*¼d. per unit is fully justified,*" says Mr. Long. Where is water heating done at ¼d.? Has Mr. Long started to do so? Let us hope that this paper will open the eyes of supply engineers (particularly of those with whom the decisions relating to tariffs rest) to the large business in water heating awaiting capture.

Let them take a wider outlook; adopt a bolder policy; and take a commercial risk. *For commercial reasons* a price not exceeding ¼d. is necessary and fully justified where coal costs 0.2d. or less; ¼d. per unit is 100 per cent. higher, and is too high to compete effectively with coke, &c.; but at ¼d., combined with a big push, the results would be staggering.

B.

June 15th, 1929.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specification will be printed and abridged, and all subsequent proceedings will be taken.

1927.

31,660. "Measurement of cross-talk in telephone lines." G. Ward. November 25th, 1926. (281,311.)

32,296. "Television apparatus." J. L. Baird and Television, Ltd. November 30th, 1927. (312,406.)

32,304. "Method of operating an asynchronously constructed generator with a commutator cascade machine, the excitation of which is supplied at least in part through a frequency-changer." Akt. Ges. Brown, Boveri et Cie. December 3rd, 1926. (281,676.)

34,501. "Electric water-heater." L. V. Smith and G. W. Waite. July 18th, 1927. (283,544.)

34,778. "Electrical condensers." Dubilier Condenser Co. (1925), Ltd. May 14th, 1927. (290,556.)

1928.

1,678. "Control of output of variable-speed electric dynamos." F. H. Royce and E. F. Clark. January 18th, 1928. (312,099.)

1,698. "Vacuum devices such as electric incandescent lamps, electron-discharge tubes, and the like." British Thomson-Houston Co., Ltd., and L. J. Clark. January 18th, 1928. (312,100.)

1,764. "Ignition mechanism of internal-combustion engines." F. W. Lanchester. January 19th, 1928. (312,103.)

1,921. "Electric time-delay devices." British Thomson-Houston Co., Ltd., H. S. Petch and R. D. Parry. January 20th, 1928. (312,104.)

2,489. "Dynamo-electric lighting systems." R. Bosch Akt. Ges. February 11th, 1927. (285,074.)

5,103. "Electric junction boxes." Sykes & Dyson, Ltd., P. Sykes and W. Cooper. February 18th, 1928. (312,382.)

5,198. "Method of and means for electrical resistance welding." Allgemeine Elektricitäts Ges. February 18th, 1927. (285,513.)

5,213/4. "Mercury-vapour arc lamps and rectifiers." G. J. Blake and G. D. G. Leadbetter. February 20th, 1928. (Addition to 294,288.) (312,116/7.)

5,262. "Insulator for electric live wires." F. Berg. February 20th, 1928. (312,205.)

5,268. "Electric communication cable." Standard Telephones & Cables, Ltd., and E. Kaempf. February 20th, 1928. (Cognate application 33,162/28.) (312,119.)

5,269. "Automatic or semi-automatic telephone systems." Standard Telephones & Cables, Ltd., J. H. E. Baker and E. P. G. Wright. February 20th, 1928. (312,120.)

5,294. "Signs or other advertising devices." British Thomson-Houston Co., Ltd., and F. E. Smith. February 20th, 1928. (312,121.)

5,356. "Regulators for dynamo-electric machinery and other electrical apparatus." F. Newton. February 20th, 1928. (312,127.)

5,379. "Base for automatic telephone instruments." P. Fitzner. May 16th, 1927. (285,795.)

5,428. "Gramophone electric 'pick-up' devices." J. Copp, F. Tait and A. C. Tait. February 21st, 1928. (312,130.)

5,488. "Method and apparatus for correcting power factor of electric circuits." E. F. Northrup. February 25th, 1927. (285,912.)

5,502. "Cable telegraphy." W. E. Beatty (Bell Telephone Laboratories, Inc.). February 21st, 1928. (312,300.)

5,511. "Electrolytic production of metals, and apparatus therefor." I. G. Farbenindustrie Akt. Ges. February 21st, 1927. (285,824.)

5,621. "Controlling means for sound-reproducing apparatus." W. H. Sayers and Electramonic Co., Ltd February 22nd, 1928. (312,384.)

5,641. "Dynamo-electric machines." J. A. Kuyser and Associated Electrical Industries, Ltd. February 22nd, 1928. (312,217.)

5,978. "Electrodeposition of metals." Electro Bleach & By-products, Ltd., J. Hollins and D. Jepson. February 25th, 1928. (312,395.)

6,024. "Alternating-current voltage regulators." J. R. P. Lunn. February 27th, 1928. (312,396.)

6,069. "Electric insulators." E. L. Stubbings. February 27th, 1928. (312,398.)

6,108. "Telephone systems." Associated Telephone & Telegraph Co. July 2nd, 1927. (293,294.)

6,528. "Diaphragms for loud-speakers and the like." R. A. Eliot (trading as Neophone Engineering Co.). March 1st, 1928. (312,409.)

6,835. "Loud-speakers of the expanding-horn type." A. J. C. Brooks. March 5th, 1928. (312,413.)

7,001. "Protection of electrical systems." General Electric Co., Ltd., and H. J. Coates. March 6th, 1928. (Cognate applications 8,184/28 and 17,415/28.) (312,416.)

7,012. "Electrical transformers." V. Z. de Ferranti and Ferranti, Ltd. March 6th, 1928. (312,417.)

7,013. "Electrical circuit-breakers." V. Z. de Ferranti and Ferranti, Ltd. March 6th, 1928. (312,418.)

7,882. "Production of electric radiating elements, particularly electron-emitting elements for electric discharge devices." E. Harsanyi. March 14th, 1927. (287,098.)

8,513. "Manufacture of arc-lamp electrodes." Compagnie Lorraine de Charbons pour l'Electricité. April 21st, 1927. (289,042.)

8,531. "Electric connection boxes for cargo clusters, portable lamps, and such like." W. Henderson, and Telford, Grier & Mackay, Ltd. March 21st, 1928. (312,430.)

8,698 "Electrical step-by-step mechanisms." I. H. Parsons and A. E. J. Ball. March 22nd, 1928. (312,432.)

8,979. "Electromagnets." W. Wadsworth & Sons, Ltd., and A. A. G. Jensen. March 24th, 1928. (312,436.)

9,469. "Wireless telegraph and telephone receiving apparatus." A. Shaw, S. H. Long and Siemens Bros. & Co., Ltd. March 29th, 1928. (312,442.)

9,564. "Piezo-electric devices." Gramophone Co., Ltd., A. Whitaker and W. H. Eccles. March 29th, 1928. (312,444.)

9,946. "Sound-amplifying devices." Decca Gramophone Co., Ltd., and G. A. Cozens. April 2nd, 1928. (312,446.)

10,107. "Electrical transformer tanks." T. Freer-Ash. April 4th, 1928. (312,448.)

10,316. "Systems of tuning wireless receiving sets and multi-contact switch therefor." C. T. Nicol. April 5th, 1928. (312,450.)

11,341. "Electric switches." Edison Swan Electric Co., Ltd., and F. Shergold. April 17th, 1928. (312,456.)

11,970. "Electric wall-plugs." T. W. John. April 24th, 1928. (312,461.)

13,943. "Electric submarine cables." Felten & Guilleaume Carlswerk Akt. Ges. October 31st, 1927. (299,761.)

14,026. "Electric couplings." H. Baron (Compagnie Lorraine de Charbons pour l'Electricité). May 12th, 1928. (312,479.)

15,406. "Joints of electric cables." W. T. Henley's Telegraph Works, Co., Ltd., and P. Dunsheath. May 25th, 1928. (312,494.)

15,407. "Joints of electric cables." British Insulated Cables, Ltd., and W. Holtum. May 25th, 1928. (312,495.)

16,843. "High-frequency electrodes." Kelvin, Bottomley & Baird, Ltd., and F. A. King. June 11th, 1928. (312,507.)

17,001. "Apparatus for controlling mechanism by means of light." General Electric Co., Ltd., and E. M. Eden. June 12th, 1928. (312,508.)

18,144. "Wireless communication and remote-control systems." C. Lorenz Akt. Ges. June 25th, 1927. (292,916.)

18,181. "Portable electric lamps." U. F. L. Steindorff. June 22nd, 1928. (312,514.)

18,447. "Index-locking devices for electrical measuring instruments." Evershed & Vignoles, Ltd., and C. Midworth. June 26th, 1928. (312,522.)

20,518. "Cooling of dynamo-electric machines." International General Electric Co., Inc. July 16th, 1927. (294,112.)

20,583. "Apparatus for the inter-conversion of mechanical and electrical oscillations such as loud-speakers." British Thomson-Houston Co., Ltd. July 18th, 1927. (294,147.)

20,725. "Electric insulators." Steatit-Magnesia Akt. Ges. October 20th, 1927. (Addition to 290,262.) (299,032.)

20,889. "Electric motor control systems." G. Somajni. July 19th, 1927. (294,180.)

21,816. "Protective apparatus for electrical distribution systems." Associated Electrical Industries, Ltd. July 27th, 1927. (294,615.)

22,174. "Electrically illuminated manœuvre-indicators for use on road vehicles." J. Baxter. July 31st, 1928. (312,544.)

22,390. "Electric switches." British Thomson-Houston Co., Ltd. August 4th, 1927. (295,037.)

24,021. "Electrical determination of irregularities in the structure of massive metal bodies." International General Electric Co., Ltd August 27th, 1927. (296,303.)

26,073. "Manufacture of Röntgen ray fluorescent screens." C. Haider. September 12th, 1927. (297,037.)

27,928. "Television apparatus." J. L. Baird and Television, Ltd. November 30th, 1927. (Divided application on 312,406.) (312,560.)

30,939. "Current-collectors for electric vehicles." G. Fischer. October 31st, 1927. (299,778.)

31,316. "Telephone systems." Siemens & Halske Akt. Ges. November 5th, 1927. (300,121.)

35,614. "Electric discharge devices." British Thomson-Houston Co., Ltd. December 2nd, 1927. (301,745.)

36,447. "Radio and the like signalling systems." Marconi's Wireless Telegraph Co., Ltd. December 9th, 1927. (302,181.)

37,256. "Method and apparatus for the measurement of distances by means of electromagnetic waves." A. Koulikoff and C. Chilowsky. December 15th, 1927. (302,602.)

38,290. "Television and like receiving apparatus." L. Thurm. December 30th, 1927. (303,178.)

38,417. "Filter circuit arrangements comprising piezo crystals." Standard Telephones & Cables, Ltd. December 29th, 1927. (303,180.)

1929.

6,132. "Test-sets for locating faults in electric transmission lines." West Manufacturing Co July 5th, 1927. (Divided application on 293,378.) (306,837.)

7,508. "Electromagnets." G. V. Lomonossoff and P. Kapitza. December 26th, 1927. (Divided application on 306,329.) (312,259.)

11,966. "Electrodeposition of metals." Electro Bleach & By-Products, Ltd., J. Hollins and D. Jepson. February 25th, 1928. (Divided application on 312,395.) (312,403.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 12th :—

Vigilus (lettering and design). No. 494,440. Class 8. Radio-telephonic apparatus and parts thereof, &c.—Thompson Manufacturing Co., Ltd., Water Lane Works, Richmond, Surrey.

Lion (lettering and design). No. 498,920. Class 8. Radio-telephonic receiving apparatus, but not including loud speakers sold separately.—L. W. Holt, 196, Shaftesbury Avenue, W.C.2.

Veelix. No. 498,961. Class 8. Exploring disks for television.—Baird Television Development Co., Ltd., 133, Long Acre, W.C.2.

Emitta (lettering and design). No. 499,224. Class 8. Electrical accumulators.—W. H. Holbird, 9, Blenheim Grove, Rye Lane, S.E.15.

G.B., Ltd.; the Grosvenor Battery Co., Ltd., Watford (lettering and design). No. 499,417. Class 8. Electric batteries (not for medical purposes).—Grosvenor Battery Co., Ltd., 2-3, White Street, Moorgate, E.C.2.

L.A.W., Lock-Atkinson Wireless (lettering and design). No. 501,128. Class 8. Instruments and apparatus for use in connection with radio-telegraphy and telephony.—S. W. Atkinson, trading as Lock-Atkinson Wireless, 311, Camden Road, N.7.

Voluvernia. No. 501,933. All goods in Class 8.—Gambrell Bros., Ltd., Merton Road, Southfields, S.W.18.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ABERDEEN.—Extension of Corporation fish market (£10,000); city architect.

ALTRINCHAM.—Block of 40 flats and additional houses, for the U.D.C.; surveyor.

ASTLEY.—Senior elementary school (350 places); director of education, County Education Offices, Preston.

AYLESHAM (DOVER).—Houses (50), for Pearson and Dorman Long, Ltd.

BARNSLEY.—Garage workshop at depôt; covered market, New Street; borough engineer. Mining and technical college (£79,660); Charles Smith, builder.

BILSTHORPE (NOTTINGHAM).—Hotel; Stanton Ironworks Co., Ltd.

BOOTLE.—Girls' secondary school (450 places); G. Fraser, architect, Wellington Buildings, Strand, Liverpool. Form of tender from S. Clark, secretary for education (deposit £2 2s.).

BRADFORD.—44 houses, White Abbey estate; city architect. Library, Bierley housing estate; city engineer.

BRIDLINGTON.—Central school (£25,000), for the borough E.C.; director of education.

BRIERLEY HILL.—Houses (84), for the U.D.C.; T. Barker and Sons, builders, Loughborough.

BRISTOL.—Houses, Speedwell estate; E. W. Poole & Son (46); J. Knox (63). Houses (46), Duckmoor Road and Wooton Road; Bristol Housing, Ltd.

BURTON-ON-TRENT. — Extensions, isolation hospital (£8,500); borough engineer.

CARLISLE.—Cinema, Caldewgate, for Workington Hippodrome Co., Ltd.; Mr. Nicholson, architect.

CHESTERFIELD.—New school and alterations old schools, Cross Street; Catholic school governors. Business premises, Church Lane, for Greville & Stuart; Jackson and Fryer, architects. Bazaar premises, for F. W. Woolworth & Co., Ltd., Kingsway, London.

COULSDON.—28 houses, Beverley Road, Whiteleafe; E. O'Sullivan, Ltd.

DERBY.—Wesleyan church, Allen Town; trustees. Premises and institute, for King Street Wesleyans (£9,500); Gee, Walker & Slater, builders.

DONCASTER.—Wesleyan church, Balby; trustees.

DORCHESTER.—Store and workshop, High Street West, for Sir Robert Williams; C. W. Pike.

DOUGLAS (ISLE OF MAN).—Alterations, High School, Park Road; Manx Education Committee. Alterations, West View Lane; Manx Co-operative Society, Ltd. Alterations, South Quay; Corlett, Sons & Cowley, Ltd.

DUNDEE.—216 houses, for Corporation (£85,000); city architect.

EPSOM.—Nurses' home, Long Grove Hospital (£15,890); J. W. Ellingham, Ltd., Dartford.

ESTON.—Secondary school, for North Riding E.C.; director of education, Northallerton.

FARNHAM (SURREY).—Additional 44 houses, for the U.D.C.; surveyor.

FIFESHIRE.—School, Cowdenbeath; clerk, Education Authority, Kirkcaldy.

GLASGOW.—Cinema, Paisley Road; A. E. Pickard. 36 houses, Castlemilk Street, Cathcart; Western Heritable Investment Co., Ltd.

GODALMING.—Church, for the Christian Science Society; particulars from Potter, Crundwell & Bridge.

HAMPTON.—Extensions, soap factory, High Street; Smiths (Hampton), Ltd.

HASTINGS.—Warehouse, 26, Castle Hill Road; P. H. Oxley, architect. Electricity supply, shop and bakery, North Trade Road, Seddlescombe, for Mr. Gregory. Alterations and extensions, Queen's Road, for Timothy White, Ltd., 30, Chandos Street, Portsmouth. Reconstruction, White Rock baths (£34,000); borough engineer.

HORSMONDEN (KENT).—Electric lighting installation, All Saints' Church; rector.

INVERNESS.—Shop and warehouses (£8,000); D. Forbes, 57, High Street.

KEIGHLEY.—Bus depôt, Hard Ings Lane; borough architect.

LEIGH.—School (460 places); S. Wilkinson, county architect, 16, Ribblesdale Place, Preston.

LONDON (HACKNEY, E.).—Factory, Shore Road; W. Silk and Son, Ltd. Garage, highways depôt for electric vehicles (£5,000); borough engineer. Factory, Downs Road; A. J. King, Ltd.

(LAMBETH, S.E.).—County Hall extension; E. Stone Collins.

LONGTON (STAFFS.).—Alterations, City Cinema, Market Street; North Wales and Border Cinemas, Ltd.

LUTON.—Factory, Midland Road, for Paul Walser, Ltd.

MAIDSTONE.—Housing scheme (185), Mote site, for the T.C.; T. F. Bunting, borough surveyor.

MALVERN.—Bank and shops, Grange Road and Church Street, for the National Provincial Bank, Ltd., London.

MARPLE.—Cinema and shops, for Walter Stock, Gem Cinema.

NEWCASTLE-ON-TYNE.—R.C. church, Benwell; parish priest.

NEWPORT (ISLE OF WIGHT).—Workshop and stores, for W. Matthews & Son, Trafalgar Road; Stratton & Millgate, architects.

OLDHAM.—Alterations and additions, The Palladium, Union Street; W. B. Baker, general manager.

PLYMOUTH.—Extensions, Dame Hannah Roger's Orthopædic Hospital School, Ivybridge; school trustees.

POULTON-LE-FYLDE.—Grammar school; S. Wilkinson, county architect, 16, Ribblesdale Place, Preston.

PURFLEET (ESSEX).—Factory; British Carbonite Smokeless Fuel, Ltd. Factory; British Indestructo Glass Co., Ltd.

REDCAR.—Extensions, Sir William Turner's school (£10,000), for governors; clerk.

ROCHDALE.—Girls' high school, Greenhill; secretary to the Education Committee.

ROTHERHAM.—Municipal lodging house; Special Corporation Committee.

RUGBY.—Central post office, North Street, for H.M. Office of Works, King Charles Street, London, S.W.

SALFORD.—School, Tootal Drive, for the borough E.C.; secretary (returnable deposit of £1 1s.).

SANDBACH (CHESHIRE).—Telephone exchange; H.M. Office of Works, King Charles Street, London, S.W.

SANDERSTEAD.—Estate development, Essenden and Beachwood Roads; Whitgift Foundation governors.

SELSDON (SURREY).—34 houses and clubhouse, Addington Park estate; W. G. Lewis. 28 houses, Littleheath Road; R. Costain & Sons.

STOCKTON-ON-TEES.—Additional 300 houses, for the T.C.; borough surveyor.

STOKE-ON-TRENT.—Municipal aerodrome; city surveyor. Housing scheme, Trent Vale; city engineer.

TILBURY.—Maternity and child welfare centre, for the U.D.C.; surveyor.

TIPTON.—Additional 86 houses and public baths (£18,045), for U.D.C.; surveyor.

TYLDESLEY.—Senior elementary school; director of education, County Education Offices, Preston.

ULVERSTON.—Grammar school; S. Wilkinson, county architect, 16, Ribblesdale Place, Preston.

UTTOXETER.—Catholic schools; S. S. Proud, architect, Town Hall (returnable deposit of £2 2s.). Additional 70 houses, for the R.D.C.; surveyor.

WHITEHAVEN.—Wesleyan church, Kells (£10,000); trustees.

WIDNES.—Secondary school (deposit £2); S. Wilkinson, county architect, 16, Ribblesdale Place, Preston.

WINCHESTER.—Electricity offices and showrooms, Twyford, for the T.C.; Cancellor & Sawyer, architects. Additional 60 houses, for the T.C.; city surveyor.

WORTHING.—Extensions, High School for Girls, for West Sussex E.C.; P. Roberts, "Fernleigh," North Street, Chichester (deposit £2 2s.).